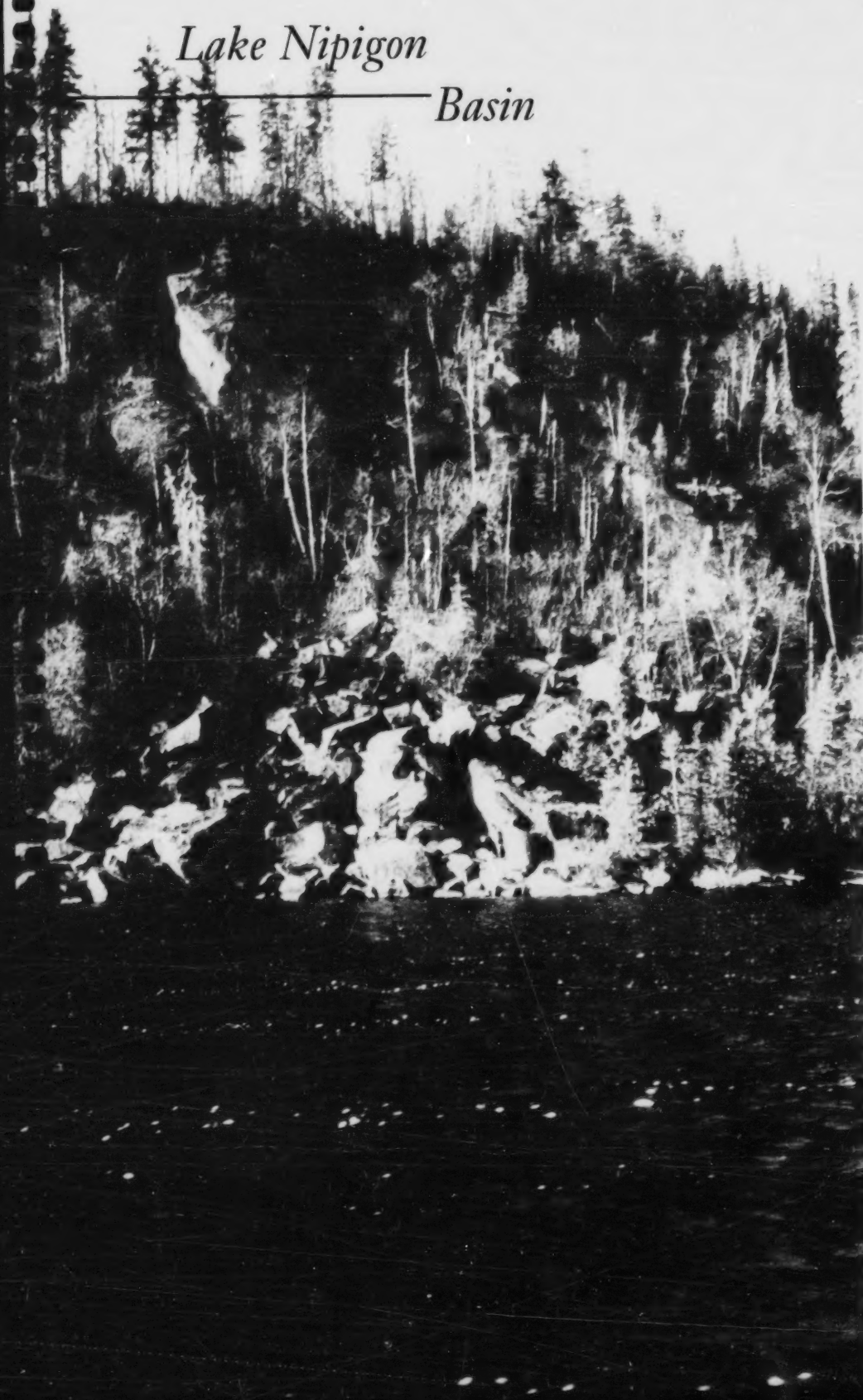


Lake Nipigon
— *Basin*

*Background
Document*

June 2001



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1. Introduction

Lands for Life and Ontario's Living Legacy

The identification of the Lake Nipigon Basin as one of nine Signature Sites under *Ontario's Living Legacy* is based on work carried out during the *Lands for Life* planning process. Three citizens' Round Tables established in the Boreal West, Boreal East and Great Lakes – St. Lawrence planning regions (Lake Nipigon Basin is located within the Boreal West Planning Region), conducted the better part of this work. The Lands for Life Round Tables, which were composed of 12 to 14 citizens, drawn from diverse backgrounds, met from June 1997 to July 1998.

The *Lands for Life* consultation process was the most ambitious public involvement initiative ever launched by the Ministry of Natural Resources (MNR). The Round Tables carried out extensive public consultations throughout their planning regions and in southern Ontario. Thousands of people were provided with opportunities to participate through a variety of means including regular Round Table meetings, public meetings, community workshops, questionnaires, written submissions, and e-mail. As part of the consultation process, extensive information was made available to the public through publications, open houses, and an Internet site.

In July 1998 the three Round Tables' draft recommendations were submitted to the Minister of Natural Resources, and subsequently combined into a *Consolidated Recommendations Report* that was circulated for public comment in late 1998; over 12,000 responses were received. The provincial government and various other sectors met during the winter of 1999 to develop strategies for enhancing the recommendations of the Round Tables to better achieve the four objectives set out at the beginning of the *Lands for Life* planning process.

In March 1999, the Premier announced *Ontario's Living Legacy* and the release of the *Forest Accord* and the *Draft Land Use Strategy*. The land use intent presented in the *Strategy* is the result of careful consideration of the Round Table recommendations, public comment, representations by interest groups and industries, and government analysis. After a review period in which over 8,000 comments were received, the *Ontario's Living Legacy Land Use Strategy* was approved in July 1999.

The Round Table's perspectives about the Lake Nipigon Basin and its significance were supported by many public comments that were received during the *Lands for Life* project. It was this initial work of the Round Tables and the input from the public that resulted in the Basin's status as a Signature Site with recognition for and protection of its special attributes.

The Lake Nipigon Basin Signature Site

Along with the Great Lakes Heritage Coast, the Lake Nipigon Basin has been identified as having a range of highly significant values that warrant special strategies (Figure 1). The Basin contains seventeen Land Use Designations and Enhanced Management Areas (existing and proposed) that are focused on retaining and enhancing the special characteristics of the area (Table 1 and Table 2). These areas also have extremely significant tourism and recreation potential that merit increased planning, management and promotion.



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There are three land use categories proposed for the Lake Nipigon Basin: Provincial Parks, Conservation Reserves and Enhanced Management Areas. These areas contain close to 370,000 hectares of land and water.

There are three land use categories proposed for the Lake Nipigon Basin: Provincial Parks, Conservation Reserves and Enhanced Management Areas. These areas contain close to 370,000 hectares of land and water. These land use designations are areas that:

- best represent the landscape and vegetation features found in the surrounding ecological area;
- include unique landscapes and natural areas that have significant natural or recreational values;
- contain representative facets of the area's geological history; and,
- have cultural significance.

The Enhanced Management Areas within the Basin contain specific values that warrant special management. The intent is not to preclude any other resource activity, but to ensure that the values identified are recognized and conserved. These values include:

- resource-based tourism in the north part of the Basin;
- potential for eco-tourism on the west shore of Lake Nipigon;
- special wildlife areas, particularly woodland caribou habitat on the north shore and islands of the Lake;
- areas for recreation including angling, hunting, and camping; and
- access nodes (primarily at existing communities) which could be used as staging areas for world-class tourism establishments on shorelines not accessible by roads or on islands. This could support local economic diversification.

The *Ontario's Living Legacy Land Use Strategy* defines some of the context and direction for decision-making in the Basin. Appendix A includes excerpts from the Land Use Strategy providing area descriptions and land use intent for each of the proposed provincial parks, conservation reserves and enhanced management areas within the signature site.

The Planning Process

In order to achieve a sustainable balance between the use and protection of the Basin's natural attributes and to carry through on the government's commitments for this signature site, MNR has begun the preparation of an Ecological Land Use and Resource Management Strategy. The process to produce this strategy was started in August of 2000 with the establishment of a project team and development of the Terms of Reference for the project. In January 2001, an Invitation to Participate was issued to the public, stakeholders and interest groups. Throughout the fall and winter of 2000/2001, project staff have been working on researching and compiling information on the Lake Nipigon Basin. Individual reports were written on fish and fisheries, wildlife, water resources, history and prehistory, economic and tourism values, life sciences, geology and mineral potential, development constraints and capabilities, archaeological values, and recreational values. This background document is basically a distillation of all these reports.

The production of this document is the first in a series of steps required to produce the Ecological Land Use and Resource Management Strategy. Next steps include the development of management options, a preliminary management strategy and final management strategy with comprehensive public consultation at each stage. Essential to this process is the establishment of a clear goal and well-defined objectives that are measurable and address the issues associated with the management and protection of the Basin. The management goal for the Lake Nipigon Basin is:

To protect, enhance and where necessary, restore the natural ecosystems, populations and wilderness quality of the Lake Nipigon Basin while allowing for tourism, recreational and industrial developments that will not compromise the integrity and environmental values of the Basin ecosystem.

THE NIPIGON BASIN

[illegible]

Table 1: Lake Nipigon Basin – Existing Protected Areas

<i>Park Name</i>	<i>Classification</i>	<i>Area (ha)</i>
Lake Nipigon	Natural Environment	918
Livingstone Point	Provincial Nature Reserve	1,800
Windigo Bay	Provincial Nature Reserve	8,378
West Bay	Provincial Nature Reserve	1,120
Kabitotikwia River	Provincial Nature Reserve	1,965
Total Area of Existing Provincial Parks		14,181

Table 2: Lake Nipigon Basin – Proposed New Designations¹

<i>Site #</i>	<i>Site Name</i>	<i>Classification/ Category</i>	<i>Area (ha)</i>
Conservation Reserves			
C2247	Lake Nipigon	N/A	133,874
C2500	Lake Nipigon Waters	N/A	48,500
C2238	Nipigon Palisades	N/A	9,556
C2383	Nipigon River	N/A	2,533
Total Area of Conservation Reserves			194,463
Enhanced Management Areas			
E2252a	South Lake Nipigon	Remote Access	35,407
E2258r	Gull Bay	Recreation	507
E2257r	West Lake Nipigon	Recreation	43,793
E2251w	Pikitugushi	Fish and Wildlife	40,551
E2237r	Lake Nipigon - Beardmore	Recreation	15,414
Total Area of Enhanced Management Areas			135,672
Provincial Parks			
P2253	Whitesand River	Waterway Park	12,506
P2256	Kopka River Add'n (part)	Waterway Park	3,245
P2250	Black Sturgeon River	Waterway Park	23,184
Total Area of Provincial Parks			38,935
Total Area of Proposed New Designations			369,070

Notes

1. Area figures are taken from the *Ontario's Living Legacy Land Use Strategy*, and should be considered as estimates for planning purposes only. These figures are subject to change depending on map scales used, boundary revisions and removal of private lands.

As identified in Appendix A, The Land Use Strategy provides direction on land use designations, permitted uses and future planning and consultation needs. Therefore, the Project Team is not starting from square one. Certain planning decisions have already been determined in the Land Use Strategy and will govern the development of objectives and options during the development of the strategy. As well, Interim Management Statements exist for the provincial parks and provide some direction.

Given the above, the Project Team has developed a list of preliminary objectives (see Appendix B) which the public is invited to review and comment on. Future management options for the Basin will be evaluated based on objective achievement.

2. Study Area

Aboriginal Aspect of the Basin

Aboriginal people have lived within the Lake Nipigon Basin since the last ice age. They were hunter-gatherers that lived in small nomadic bands, making their living from the natural resources of the area, and trading goods with other Aboriginals.

Arrival of the Europeans in the 1600s and subsequent development of the Basin resulted in a change to the cultural landscape. Trading with Europeans and the interactions of the two cultures brought about changes in the Aboriginal nomadic lifestyle and led to the development of communities.

There are six First Nations; Biinjitiwaabik Zaaging Anishnaabek (Rocky Bay), Gull Bay, Lake Nipigon Ojibway, Red Rock, Sand Point and Whitesand, as well as two Aboriginal groups seeking official band status; Poplar Point and Poplar Point Ojibway. There are also three unpopulated reserves within the Basin; McIntyre Bay, Jackfish Island and Parmashene. The Aboriginal communities use these areas for cottaging and recreation.

The First Nations and bands to varying degrees actively participate in resource based industries: forestry, mining, commercial fishing, hydroelectric power generation and natural gas pipe lines within the Basin. Some First Nation and Aboriginal group members have expressed an interest in, and developed proposals for, the creation of tourism attractions in the Basin while others have concerns over any development occurring in the study area.

Description of the Basin

Lake Nipigon, at 484,800 hectares, is the 38th largest lake in the world (Herdendorf, 1982), the largest water body wholly within the province of Ontario and the largest headwater

to the Great Lakes-St Lawrence waterway system. Although close to Thunder Bay and north of the merging of Highways 11 and 17, Lake Nipigon remains relatively remote and represents one of the least developed aquatic environments in the road accessible part of the province. Lake Nipigon Basin can be described as a major natural crossroads, where geological, ecological, hydrological and recreational attributes come together in a hub of significant natural importance.

Lake Nipigon Basin stretches from Wabakimi Provincial Park in the north to Lake Superior in the south and encompasses the Nipigon River, Black Sturgeon Lake, Black Sturgeon River and Whitesand River. The Basin includes a significant array of archaeological, historical, cultural and natural features, as well as important forest, mining, tourism, recreation and commercial fishing resources.

The northern portion of the Lake Nipigon Basin represents the southern limit of the retreating range of woodland caribou in northwestern Ontario. This species has been listed as threatened in Canada, a similar listing for Ontario is expected in the near future. The islands of Lake Nipigon provide critical calving habitat for this species. Migration corridors pass through several portions of the Basin. Other wildlife of note include an increasing number of breeding white pelicans (Endangered in Ontario), numerous bald eagles (endangered in Ontario) and osprey nesting areas.

Lake Nipigon supports a provincially significant and diverse fish community (46 species) of which a number of species have been listed nationally by COSEWIC as "threatened" (shortjaw cisco and deepwater sculpin). Both the lake trout and brook trout fisheries are considered to be world class



*Lake Nipigon Basin
stretches from
Wabakimi
Provincial Park in
the north to Lake
Superior in the
south and
encompasses the
Nipigon River,
Black Sturgeon
Lake, Black
Sturgeon River and
Whitesand River.*

The Lake Nipigon Basin contains one of the most impressive arrays of geologic, landscape and vegetation assemblages in northwestern Ontario, many of which are provincially significant, unique and rare.

and provide important recreation and tourism opportunities. The Nipigon River also has a reputation for its outstanding brook trout fishery, a reputation that harks back to the mid 1800s.

The Lake Nipigon Basin contains one of the most impressive arrays of geologic, landscape and vegetation assemblages in northwestern Ontario, many of which are provincially significant, unique and rare. One of the most striking geological features are the diabase cuestas that form vertical cliff faces of up to 150 metres and more in height along portions of the Lake Nipigon shoreline and several islands and within the proposed Nipigon Palisades Conservation Reserve. The north and south facing talus slopes of these features may harbour plant species more commonly found in arctic or more southerly environments. Many of these cliffs offer challenging rock climbing opportunities in the summer and ice climbing during the winter season.

In addition to the generally rugged Precambrian shield terrain found throughout the Basin, there are a wide diversity of geomorphologic features associated with the last continental glaciation such as: moraine deposits, eskers, drumlins, varved clays and raised shorelines. Major post-glacial spillways from the prehistoric glacial Lake Kelvin are situated to the south of Pijitawabik Bay and along the Black Sturgeon River valley.

The Lake Nipigon Basin is situated within the Central Boreal Forest Region and Hills (1959) Site Region 3W, which is characterized by a dry-humid, mid boreal forest type. Typical vegetation of the area includes aspen, white birch, white spruce and balsam fir on the well drained sites with the occasional red and white pine on the uplands. Black spruce and alder are common in lowland areas. There are also rare plants within the Nipigon Basin such as limestone oak fern and arctic disjuncts such as Hudson Bay eyebright.

Lake Nipigon has been a valued recreational and tourism resource for over a century. Over time, there have been improvements to road

access systems, increases in recreational use through snowmachines, watercraft and off-road vehicles, and an increased public interest in seeking wilderness recreation and tourism opportunities. In response to this increased activity and future potential, Lake Nipigon and its surrounding Basin has been subject to a variety of proposals to develop additional facilities to take advantage of this increasing pattern of use.

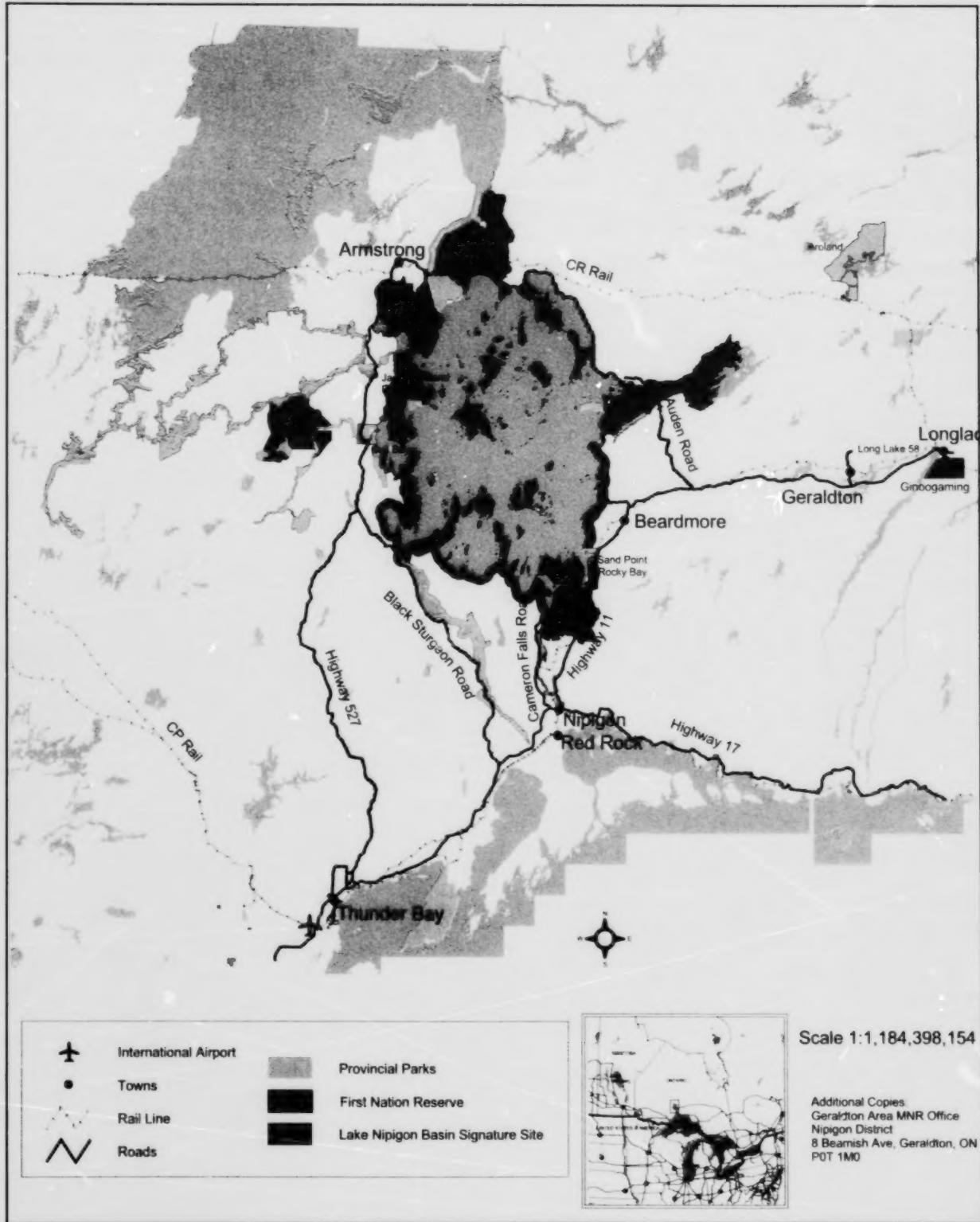
Regional Setting

Lake Nipigon is located approximately 170 kilometres northeast of Thunder Bay and 50 kilometres north of the Town of Nipigon. It is situated between 88 and 89 degrees longitude and between 49 degrees 15 minutes and 50 degrees 15 minutes latitude (Figure 2). To the north, the Lake Nipigon Basin Signature Site is connected to Wabakimi Provincial Park and to the south, the Basin connects with the Great Lakes Heritage Coast Signature Site. Other provincial parks in the area include Sleeping Giant, Ouimet Canyon and Rainbow Falls.

Highway 17 runs across the south end of the Basin, traversing the Nipigon River at Nipigon. To the west of the lake Highway 527 provides access to the communities of Armstrong and Gull Bay. Highway 580 links the community of Beardmore to the east shore of Lake Nipigon. Highway 585 runs north along the west side of the Nipigon River to Pine Portage. At the south end of the lake near Orient Bay, Highway 11 follows the shoreline within the Nipigon Palisades Conservation Reserve (C2238) for several kilometers before heading northeast to Beardmore.

The City of Thunder Bay has an international airport and is the largest service centre in the region. There are nine communities within or very close to the Nipigon Basin: Beardmore (part of the newly created Municipality of Greenstone), MacDiarmid, Armstrong, Nipigon, Red Rock, Gull Bay, Biinjitiwaabik Zaaging Anishinaabek (Rocky Bay), Whitesand

Figure 2 - Regional Setting



and Red Rock (Lake Helen). The tiny hamlet of Orient Bay, originally built as a stop point for the CNR, is located at the south end of Pijitawabik Bay, approximately 10 kilometres south of MacDiarmid. These communities provide essential services such as gas, shopping, groceries, banking, restaurants, hotels and medical care. Other population centres in this region of Northwestern Ontario include Terrace Bay, Schreiber, Manitouwadge, Geraldton, Nakina, Longlac, Jellicoe and Caramat.

The main transcontinental Canadian National Railway (CNR) line traverses the Whitesand Waterway Park (P2253) and the Pikitigushi Enhanced Management Area (E2251) north of Lake Nipigon. A CNR station at Armstrong offers a passenger drop off and pickup service. Pickup service is available upon request at isolated railway communities such as Mud River and Ferland at the north end of the lake. A second CNR Line travels through the southern portion of the Basin and crosses Pijitawabik Bay.

At present the Indian Reserves of Gull Bay and Rocky Bay are the only occupied reserves located within the Basin. The Red Rock First Nation community is located just south of the Basin. The Jackfish Island and McIntyre Bay Indian Reserves have a small number of summer residents. The Whitesand Reserve, just west of Windigo Bay, reverted to the Crown in the late 1950's and a new reserve was established next to the community of Armstrong. A portion of Lake Nipigon Provincial Park has been deregulated to provide reserve lands for Sand Point First Nation. Official reserve status for these lands has not yet been obtained and no community currently exists at this location. Other Aboriginal communities with traditional ties to the Lake Nipigon Basin but without established communities or reserve lands include Lake Nipigon Ojibway First Nation, Poplar Point Ojibway, and Poplar Point.

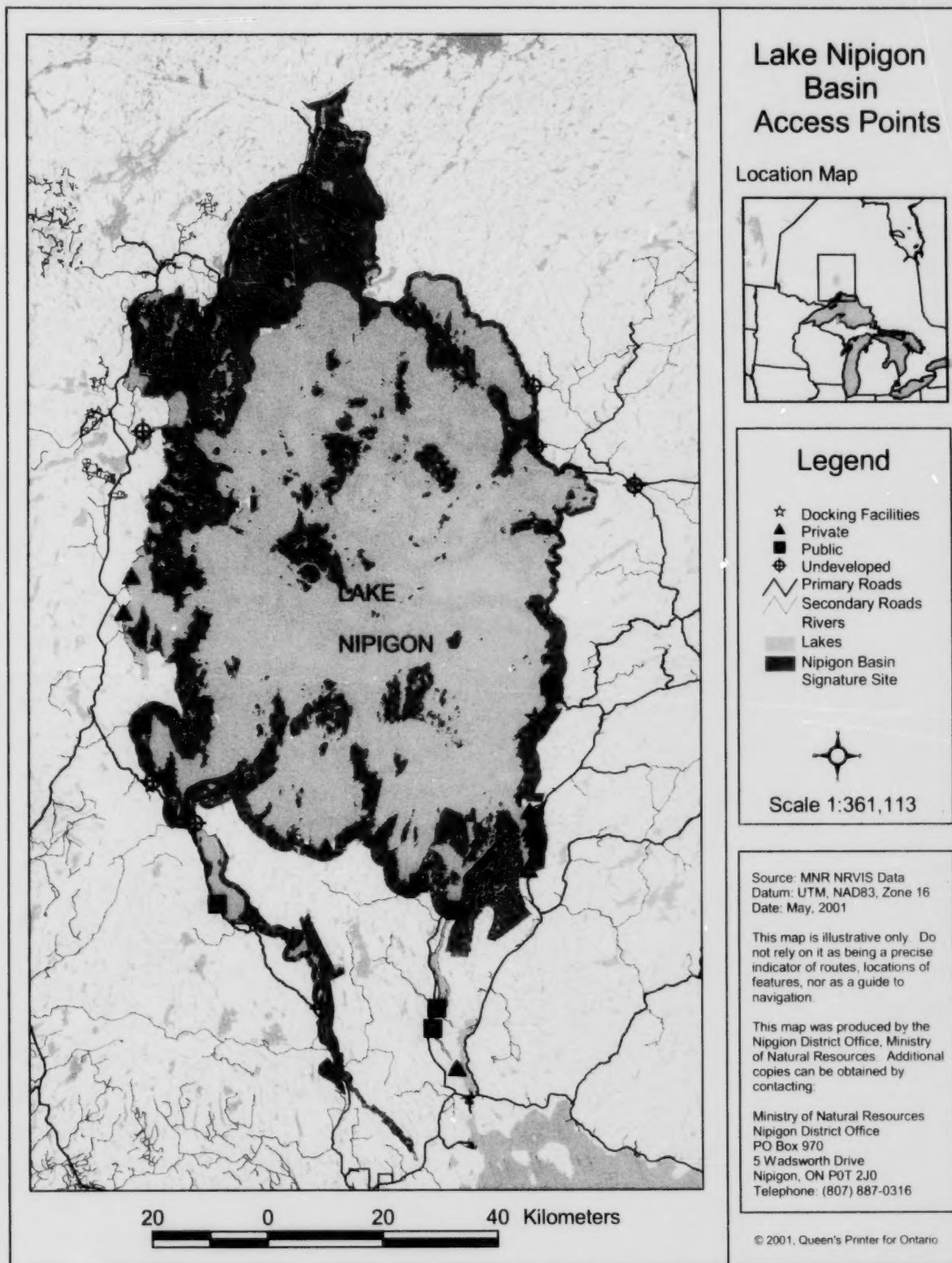
Access

Although there is an extensive network of forest roads in the Lake Nipigon Basin, access points directly on the lake are limited. Areas where the lake is most easily accessed are in southern regions near Orient Bay and on the eastern shores near Beardmore. Access here is facilitated by the proximity of Highway 11 and by several public and privately maintained boat ramps. In the remainder of the Basin and within the protected areas surrounding the lake, entry is limited to small access points, where there is little or no maintenance.

Access to Lake Nipigon for recreational purposes, has been well established at several specific areas. These access points include private docks/boat ramps, public boat launch facilities, marinas and other undeveloped/unmaintained access points. The primary points of entry are at South Bay, Pine Portage, High Hill Harbor, Poplar Point, Chief Bay, King's Landing and Orient Bay (Figure 3).

On the east shore of Lake Nipigon, access is provided at High Hill Harbor and Poplar Point Campground, which are owned and maintained by the newly created municipality of Greenstone. The portion of Lake Nipigon Provincial Park that has been deregulated for the establishment of Sand Point First Nation Reserve is the developed portion. There is the possibility that Sand Point First Nation may operate the campground and access point in the future. To the south near Orient Bay, private launching areas are available from tourist lodges. South Bay has an access point that is jointly maintained by the South Bay Angler's Association and the MNR. There is a boat ramp and parking facilities here as well as at Pine Portage. At King's landing just south of Gull Bay, local residents maintain an access area. A private launching also exists at the McIntyre Bay Indian Reserve on the south shore of Lake Nipigon.

Figure 3 - Access Points



There are a total of 142 active mining claims in the area proposed for protection within the basin. Many of these claims are grouped along major fault zones.

Whitesand Waterway Park may be entered off of landings from the Pikitigushi Road at the Pikitigushi River and from Jojo Lake. To protect remote tourism lakes within the Whitesand Waterway Park several roads within the Pikitigushi EMA are closed to public travel under the authority of the *Public Lands Act*.

Access to Nipigon River can be achieved at Alexander Dam and Jessie Lake. Parmashene Park is located at the south end of the river and is part of the Lake Helen Reserve. Boat launching, parking and picnicking facilities are available to band members.

Access to the Black Sturgeon Waterway Park is obtained from the Black Sturgeon Road. There are specific entry points where the Black Sturgeon Road or secondary roads pass within a short distance of the river. These areas are located at the north end of Black Sturgeon Lake, Split Rapids at the south end of Black Sturgeon Lake, Nonwatin Lake, Eskwanonwatin Lake and at the Camp 42-road crossing. None of these points of entry are maintained. Outward Bound maintains a private access point on Crown leased land on Black Sturgeon Lake.

There is a road under construction through Windigo Bay Nature Reserve to allow Whitesand First Nation to access a recently developed native healing facility. Use of the road is restricted to members of Whitesand Band.

Land Tenure and Development

Although the Trans-Canada Highway traverses the southern portion of the study area, remarkably little development or land disposition has occurred within the Lake Nipigon Basin (Figures 4 & 5). The islands, Lake Nipigon shoreline and surrounding land are almost exclusively Crown owned. The boundaries of all parks and conservation reserves within the signature site exclude patented land, mining claims and mining leases.

Within the Lake Nipigon-Beardmore EMA (E2237r) alienated lands include the community of MacDiarmid, Rocky Bay Indian Reserve, the municipally owned Poplar Point campground and High Hill Harbour Marina (Eva Township). A number of tourism establishments, seasonal and residential dwellings are located at Orient Bay. Also within this EMA, there are 19 privately owned cottage lots located just north of the Poplar Point campground.

There are a fair number of patented parcels in Ledger and Purdom Townships which are proximal to Nipigon Palisades Conservation Reserve (C2238). Several of these parcels fall inside the boundaries of the conservation reserve (Gretel Lake area). There are also patent parcels along Highway 11, north and south of Keemle Lake, at Reflection Lake and just south of Orient Bay where commercial tourism establishments have been developed

Along the south and west shores of Lake Nipigon, alienated lands include the Indian Reserves of Gull River, McIntyre Bay and Jackfish Island. Fifty cottage lots exist on McKenzie Lake and 27 on Waweig Lake in E2257r. Innes Township, which borders McIntyre Bay, has some patented parcels, most of which are Crown patents.

There are a total of 142 active mining claims in the area proposed for protection within the Basin. Many of these claims are grouped along major fault zones. On the West side of the Signature site, these claims are concentrated around Black Sturgeon Lake, Chief Bay, English Bay, Havoc Lake and Pillar Lake. On the east side of the Basin, is the Beardmore-Geraldton "greenstone belt". Numerous mining claims have been staked around Poplar Point, Maryjane Lake and Mungo Point. As stated in Ontario's Living Legacy Land Use Strategy, active mining claims will be designated as Forest Reserves and not regulated as part of the conservation reserve or park. Should these claims be retired, then these lands will be incorporated into the protected area.

Figure 4 - Land Tenure

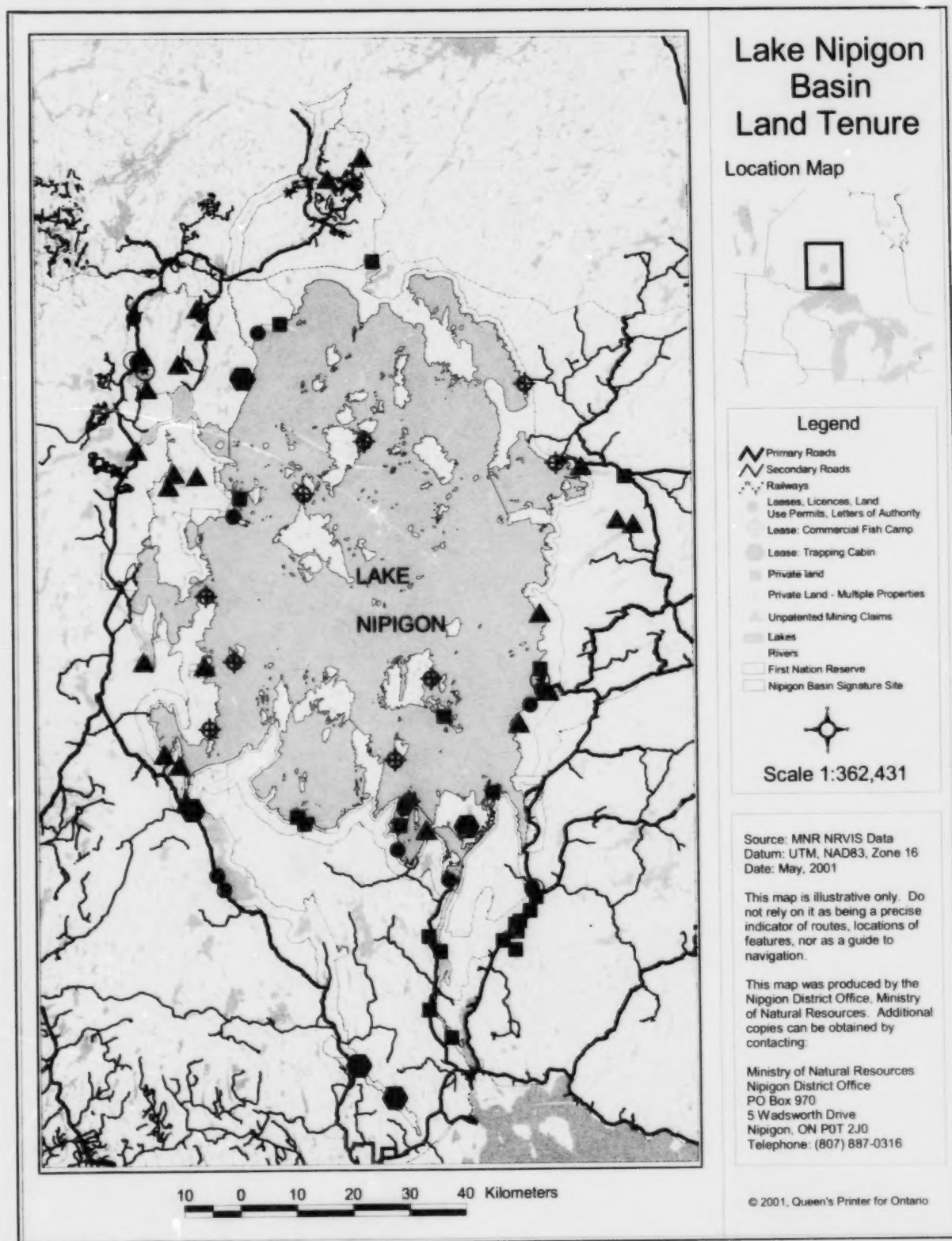
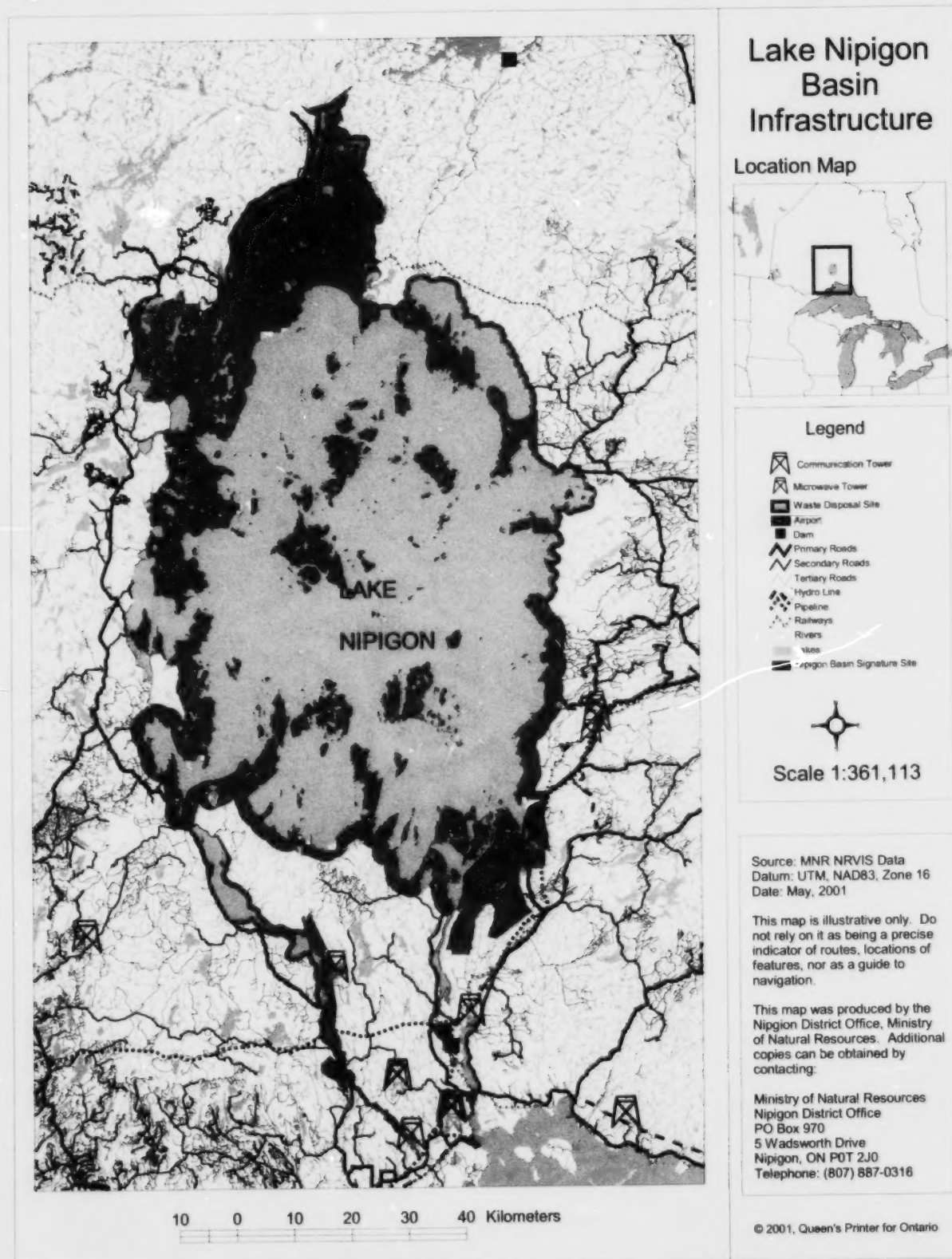


Figure 5 - Infrastructure



Twenty-one land use permits exist within the Signature site for uses such as docks, private recreation camps and outposts. There are 6 licenses of occupation on Black Sturgeon Lake, Davis Island, Jessie Lake and Poplar Point Campground. Eleven letters of authority have been issued for uses such as commercial fishing cabins and docks.

There are three power-generating facilities along the Nipigon River. They are located at Cameron Falls, Pine Portage and Alexander Falls. Total power generation is 266 megawatts. In addition there are several dams around the Basin that serve to control water levels and are part of a larger project associated with the Ogoki water diversion constructed in 1943. These include the Waboose and Summit dams and an earth berm at the northern limit of Black Sturgeon Park. There is a power generating facility located on the Namawaminikin River, which due to mechanical difficulties is not yet operational.

Hydro transmission lines extend southward from the Nipigon River power facilities. The communities of Armstrong and Gull Bay are not connected to the Ontario power grid and as a result, electricity is obtained from diesel powered generating stations.

There is a gas pipeline operated by Trans Canada Pipelines, which traverses the Black Sturgeon River Provincial Park and both the Nipigon River and Palisades Conservation Reserves. Trans Canada Pipelines also operates a natural gas co-generation station in the area of Pijitawabik Palisades Conservation Reserve (C2238).

Telecommunication, navigation and radio towers are widely dispersed throughout the Basin. They are generally within the vicinity of existing communities. Most of the towers within the immediate vicinity of the lake and along the east shore are for navigational purposes.

There are no waste disposal sites located within any of the protected areas but there are sites in proximity, including: Nipigon municipal waste disposal site off of Cameron Falls Road (Hwy. 584), Lyon Township waste disposal site on Highway 11/17, Armstrong municipal waste disposal site on Airport Road, Polly Lake waste disposal site north of Polly Lake on Limestone Road, Beardmore waste disposal site in the northwest corner of town, and MacDiarmid waste disposal site at the north end of Kilkenny Township, west of Highway 11.

There are numerous aggregate pits in the Lake Nipigon Basin area used for forest access road construction, highway maintenance and other construction needs. Some of these pits fall within the boundaries of the proposed protected areas. As per Ontario's Living Legacy Land Use Strategy, aggregate pits already existing within the proposed boundary of a park or conservation reserve, will be designated as forest reserves. If the permit is retired, the site will be recommended for regulation into the protected area. Four aggregate pits are located north of Keemle Lake on the Gorge Creek Road within C2238. Three sites held by Buchanan Forest Products are located inland from Humbolt Bay, south of the Onaman River. These sites fall within E2229w. Buchanan also holds a permit for a pit at the south end of Ombabika Bay in C2247. Along the west side of Nipigon River, the Ministry of Transportation (MTO) operates two aggregate pits in Purdom and Booth Townships. These fall within C2383. Bowater Pulp and Paper Co. developed two aggregate pits bordering Black Sturgeon River for forest operations. Harvesting in this area was complete in 1999 and these permits have since expired.

Social and Economic Context

The communities within and around the Nipigon Basin are representative of small communities in the north and include three organized municipalities, one unorganized community and seven Indian reserves.

The communities within and around the Nipigon Basin are representative of small communities in the north and include three organized municipalities, one unorganized community and seven Indian reserves.

Employment is mainly generated through resource industries such as logging, mining and resource-based tourism as well as through the government and service industry. The history of the Basin stretches back to the retreat of the last glacier through to the fur trade, early resource industries, the building of the railways to current times. Community image, identity, location and infrastructure are a result of this rich and varied past.

Gull River Indian Reserve, located on the west side of Lake Nipigon, is 42.25 km² and has a population of 159 individuals. Whitesand Reserve, located north of the town of Armstrong, has a population of 115 and a land base of 2.4 km² (Table 3). Lake Helen Indian Reserve is located on Lake Helen, just north of the Town of Nipigon and has a population of 238. Rocky Bay Indian Reserve is located at McDiarmid on the east shore of Pijitawabik Bay. Although no current statistics are available, it is estimated the reserve's population is approximately 200. As mentioned above, Jackfish Island, McIntyre Bay and Sand Point Reserves do not have permanent residents. Unemployment rates are comparatively high on the reserves. Employment is derived mainly from the service sector.

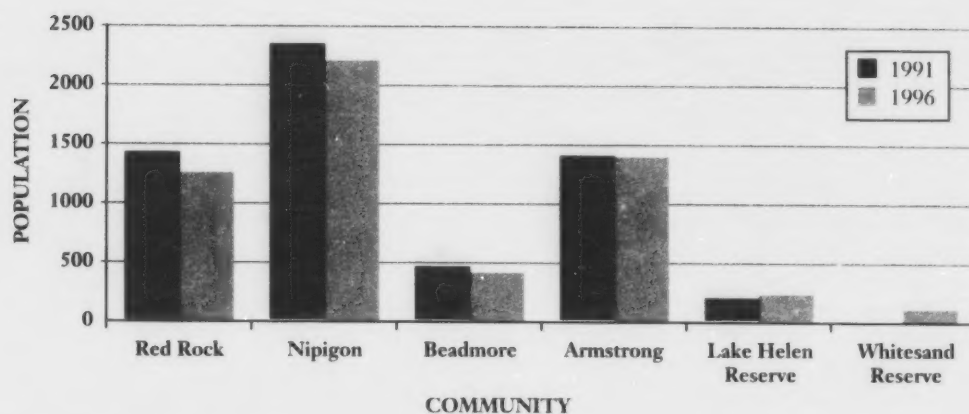
The community of Armstrong, population 1,398, lies 25 km west of Lake Nipigon's Windigo Bay along the CNR line. Road access to the town is via Highway 527 from Thunder Bay, a distance of 250 km. The population of Armstrong has remained stable since 1991 (Figure 6). Major employers in the community include the forest industry, Canadian National Railways, MNR, and the OPP. There are numerous fly-in tourist outfitters in the vicinity of the town providing remote hunting and fishing opportunities.

Red Rock is located south of Nipigon, off of Highway 11/17. The population is approximately 1,258, which represents a decline of 11.5% since 1991 (Figure 6). The town covers a land base of 102.7 km². The major employer in Red Rock is Norampac, a container board manufacturer formerly known as Domtar. Red Rock has the highest average employment income in the area measuring on average \$30,266. This is greater than the provincial average of \$27,309.

Nipigon, believed to be one of the oldest communities on the north shore of Lake Superior, is situated on the Nipigon River and is the largest settlement in the Basin. The population has declined 5.5% since 1991, from 2,338 to 2,210 individuals (Table 3). The Weyerhaeuser plywood mill, Norampac in Red Rock and tourism are the main economic activities in the area. Average income in Nipigon is \$26,026.

The Town of Beardmore was amalgamated within the Municipality of Greenstone on January 1, 1998. Beardmore was established when gold was discovered in the area in 1931. Although the mines shut down in 1965, exploration is still an important activity in the Beardmore area today. Approximately 40 prospectors make an income from exploration activities, which in turn provides spin off dollars for the community. Major employers in this community are the mills in Nipigon and Red Rock, and the tourism industry. Beardmore also runs the municipal campground and marina at Poplar Point, which generates jobs and spin off dollars for the community. Average income is \$21,317 (Table 3).

Figure 6: Population changes from 1991 to 1996 for profiled communities around the Lake Nipigon Basin Signature Site



(source: Statistics Canada, 1996)

Table 3: Profiles of Communities and Reserves in Lake Nipigon Basin

	Red Rock	Nipigon	Beardmore	Armstrong	Lake Helen Reserve	Whitesand Reserve	Province of Ontario
Population							
Population 1991	1,421	2,338	454	1,394	192	0	1.0×10^6
Population 1996	1,258	2,210	418	1,398	238	115	1.1×10^6
Population Change (%)	-11.5	-5.5	-7.9	0.3	24.0		6.6
Land Area in km²							
Unemployment rate (%)	11.9	10.5	32.6	6.2	43.5	37.5	9.1
Average Employment Income							
(\$)	30,266	26,026	21,317	20,298	N/A	N/A	27,309

(source: Statistics Canada, 1996)

3. Natural Environment and Resources

Climate (Taken from MNR, 1987)

Lake Nipigon Basin is characterized by a modified continental climate (Table 4), which is typified by long cold relatively dry winters and warm to hot and relatively humid summers (Chapman & Thomas, 1968 in MNR, 1987). Although the area lies in the path of southerly moving continental polar air masses, these temperatures are moderated by the effect of large water bodies such as Lake Nipigon.

Lake Nipigon tends to create high humidity conditions and depressed spring and summer temperatures, thereby having a moderating influence on the surrounding mainland. Since the lake does not freeze until late December, shoreline areas remain slightly warmer during early winter. In summer the reverse is true, with cool lake waters lowering temperatures slightly along the shoreline. The degree of moderation diminishes relative to the distance from the lake.

The mean annual temperature for the area ranges from -2 degrees Celsius to +2 degrees Celsius with a mean July temperature of 15 degrees Celsius and a mean January temperature of -17 degrees Celsius. The prevailing winds are from the west to northwest during the fall, winter and summer and from the north to northwest during spring. Wind velocities on the lake during open water season often exceed 30 kilometres per hour.

Lake Nipigon affects precipitation in the area as prevailing winds travel over the lake and pick up moisture, particularly in the late fall and early winter before the lake freezes. This results in heavy snowfall in the area, especially along the east shore, where accumulations are greater than in the surrounding area. Average snow accumulations reach approximately 64 to 76 cm and may occasionally reach as much as 100 cm.

The total annual precipitation is well distributed throughout the year, with little or no water deficiency at any time during the growing season. Mean annual total precipitation ranges from 71 to 76 cm. The average length of the growing season in the Lake Nipigon Basin is 140 - 155 days. The average frost-free period is 75 - 110 days, although this varies considerably from year to year. There are no guaranteed frost-free days, meaning that frost can be expected at any time during the summer.

The mean annual temperature for the area ranges from -2 degrees Celsius to +2 degrees Celsius with a mean July temperature of 15 degrees Celsius and a mean January temperature of -17 degrees Celsius.

Table 4 - Climate Data for Lake Nipigon Basin

Mean Annual Temperature	-2°C to 2°C
Mean January Temperature	-17°
Mean July Temperature	15°
Average Frost Free Period	75 - 110 days
Annual Precipitation	64 cm - 76 cm

Earth Sciences

Bedrock Geology

The entire Basin of Lake Nipigon lies within the Canadian Shield (Figure 7), an extensive rolling bedrock dominated plain consisting predominantly of Precambrian crystalline igneous and metamorphic rocks with minor occurrences of sedimentary rocks (North-South Environmental, 2001). The Canadian Shield is divided up into a number of provinces and sub-provinces on the basis of overall differences in internal structure and style of folding (Stockwell in MNR, 1987). Lake Nipigon and most of its shoreline and islands lie within the Nipigon Plate, a sub-province of the Southern Province of the Canadian Shield. The northern shore of the lake and portions of the eastern shore lie within the larger Superior Province of the Canadian Shield.

The oldest Precambrian rocks are represented by east-west trending belts of Archean (early Precambrian) metavolcanic and metasedimentary rocks. These east-west trending formations, commonly referred to as 'Greenstone Belts', were later intruded by granite bodies during periods of mountain building. Granitic rocks occurring either as massive to weakly foliated plutons, formed from the cooling of magma at depth, or as layered migmatitic rocks derived from the partial assimilation of preexisting volcanic and sedimentary rock.

The Southern Province bedrock is dominated by extensive, flat-lying Logan and Nipigon diabase sills. These make up the famous *Nipigon Plate* assemblage of Proterozoic (late Precambrian) mafic to ultramafic intrusive rocks that cover a large portion of the Nipigon Basin. Notably, the Nipigon Plate rocks are approximately 200 m thick and cover or drape over, steeply dipping older Archean rocks underneath. They are compositional equivalents to Osler Group flood basalts found in the Lake Superior Archipelago (Drost, 2001). The Nipigon Plate rocks form one of the more interesting observable features of the Lake

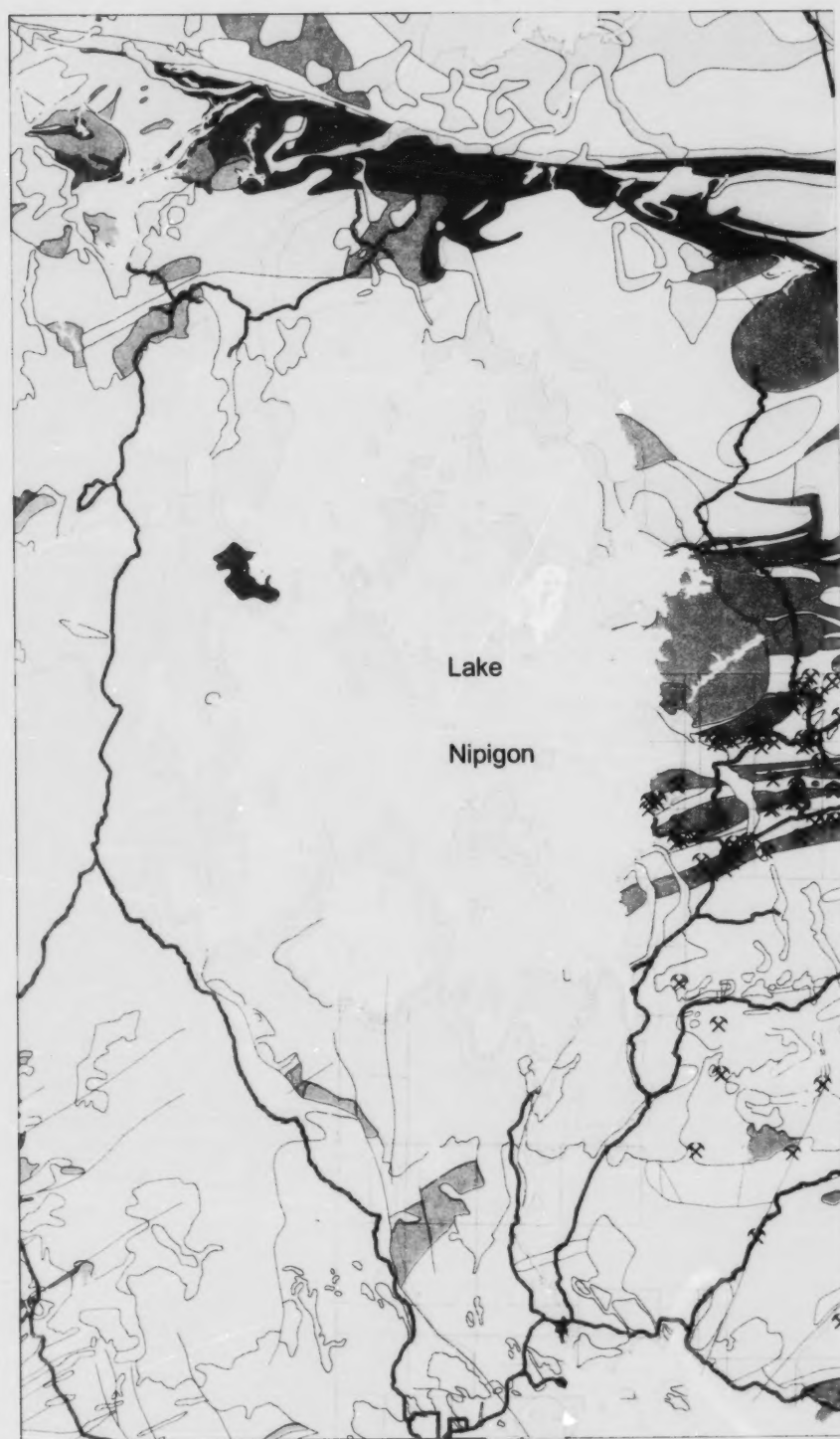
Nipigon Basin. Over time, the softer sedimentary strata have been eroded away, leaving spectacular displays of cliffs and outcrops, particularly in the Pijitawabik Palisades area near Orient Bay and on the northwest shore of Lake Nipigon (North-South Environmental, 2001).

The Nipigon Basin was developed along a major fault zone interpreted as part of an 'aulacogen' or "failed arm" rift valley (graben), extending north from the *Mid-Continent Rift* structure that controlled the development of Lake Superior. The rift graben is 25-50 km wide and extends from the east-west trending arcuate Mid-Continent Rift zone in Lake Superior, north along a trend which underlies the Nipigon Basin. Related Basin faults such as the Black Sturgeon Fault, are traceable magnetically under the Nipigon Plate. The Black Sturgeon Fault represents one of a series of major crustal structures that controlled magma emplacement and the geological evolution of the Nipigon Basin (Drost, 2001.).

The Black Sturgeon fault controls the deposition of bedrock geology in the southern portion of the Nipigon Basin. The Black Sturgeon River valley mimics the fault zone as an area of structural weakness and erosional susceptibility. The underlying fault controls the contact between Archean granitic rocks to the east, and Proterozoic Sibley Group sediments, mainly flat-lying to weakly dipping shales, sandstones and conglomerates, to the west (Drost, 2001).

In the northern portion of the proposed Black Sturgeon River Provincial Park area, a "window" of east-west trending Archean metasedimentary and metavolcanic rocks (the *Beardmore-Geraldton Greenstone Belt*) are exposed on the east side of the Black Sturgeon river. These consist of steeply dipping conglomerates, greywackes, quartzites, argillites, slates, mica schists and limestones (sediments) and intermediate to mafic volcanics including pillowed lava flows (Drost, 2001).

Figure 7 - Bedrock Geology



Lake Nipigon Basin Bedrock Geology



Legend

- ✕ Prospects and Past Producers
- OLL Protected Area
- Townships
- Faults
- Primary Roads
- Lakes

Geology

- 34a Logan and Nipigon silt (1109 Ma) diabase silt
- 31 Sibley Gp.
- 30a Granite, alkali granite, granodiorite, quartz feldspar porphyry, minor related volcanic rocks (1.4 to 1.5 Ga)
- 15 Massive granodiorite to granite
- 14 Diorite-monzodiorite-granodiorite suite
- 13 Muscovite-bearing granitic rock
- 12 Foliated tonalite suite
- 11 Gneissic tonalite suite
- 10 Mafic and ultramafic rocks
- 10a Gabbro
- 10c Ultramafic rocks
- 7 Metasedimentary rocks
- 7d Conglomerate and granite
- 7e Paragneiss and migmatites
- 6 Felsic to intermediate metavolcanic rocks
- 5 Mafic to intermediate metavolcanic rocks
- 4 Mafic to ultramafic metavolcanic rocks
- 4b Mafic metavolcanic rocks, metasedimentary rocks and pyroclastic rocks
- 3 Mafic metavolcanic and metasedimentary rocks
- 2 Felsic to intermediate metavolcanic rocks



Scale: 1:1,361,113

Source: MNR NRVIS Data
Datum: UTM, NAD83, Zone 16
Date: May, 2001

This map is illustrative only. Do not rely on it as being a precise indicator of routes, locations of features, nor as a guide to navigation.

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Surficial Geology (Taken from North-South Environmental & MNR, 1987)

The surficial geology of the Lake Nipigon area is dominated by events that occurred during the late Wisconsin glacial period and during the early Holocene, or post-glacial period (Figure 8). The landscape is dominated by an eroded, glacially molded bedrock surface with pockets and localized deposits of glacial till, peat, and glaciolacustrine sands and silty clays.

During the late Wisconsin, small localized and shallow pockets of ground moraine (a non-stratified, not obviously sorted sediment) were deposited between numerous rock outcrops. The major glacial events of the study area are marked by four moraines – the Kaiashk, Onaman, Nipigon, and Crescent moraines. These moraines are generally found outside the extent of the parks and reserves of the study area, however small sections of the Kaiashk Moraine occur near the shore in the area between Gull Bay and Wabinoosh Bays.

The late glacial history of this area is quite complex. Essentially, the study area was ice covered until the very latest stages of the retreat of the Wisconsin glacier. The Kaiashk interlobate moraine, which trends NE-SW to the southwest of Lake Nipigon, formed as the ice retreated substantially from northwestern Ontario. This allowed significant drainage of Glacial Lake Agassiz into the Superior Basin. Subsequently, the ice retreated to the north and east then re-advanced during the Marquette stadial approximately 10,000 years ago. This likely formed the Nipigon Moraine which is a N-S trending moraine, roughly paralleling but inland of the present western shore of Lake Nipigon. As the ice retreated from this position, the Onaman interlobate moraine formed along a weakness within the glacier, to the northeast of Lake Nipigon. At the same time (approximately 9,500 years ago) Glacial Lake Kelvin formed along the ice margin, eventually occupying all of the current Lake Nipigon Basin. Lake Kelvin subsequently drained into Lake Superior forming the present-day Lake Nipigon.

Within study area parks and conservation reserves, shallow water sand deposits (plains and beaches) of Glacial Lake Kelvin are best represented along the north and northeast shores of Lake Nipigon, particularly north of Windigo Bay. Glaciolacustrine features can also be seen along the Kabitotikwia River floodplain. Occasional deeper water silty clay glaciolacustrine deposits of Lake Kelvin are found along the southwest shore and to the east in the vicinity of Humboldt and Ombabika Bays (the South Peninsula).

In the Lake Nipigon watershed, the overburden of Lake Nipigon is primarily characterized by morainic material comprised of silt and sand. This was a result of erosive action by the retreating glacier that was accompanied by the deposition of outwash sand and gravel. These deposits characteristically are sorted and stratified and usually comprise important aggregate resource areas. Notable deposits occur in Innes Township and north of Windigo Bay.

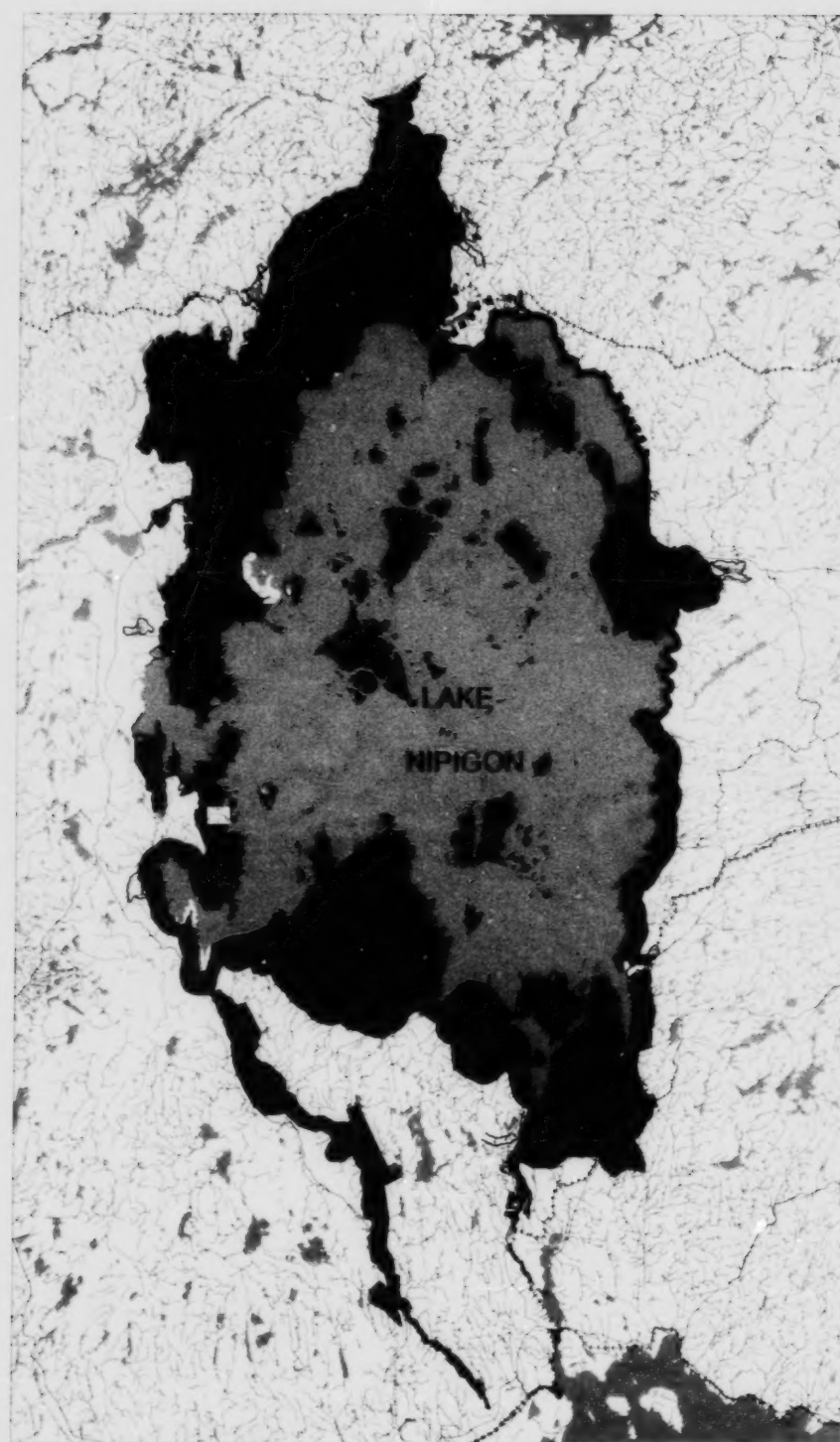
Fine sand, silt and clay were deposited over much of Lake Nipigon area adjacent to Gull Bay, English Bay, Windigo Bay, Ombabika Bay and Humbolt Bay. These sediments represent disposition in relatively deep water and indicate inundation by a glacial lake.

Deltas were formed wherever glacial meltwater systems emptied into Lake Kelvin. For example, the deltaic sand and gravel which occurs in the Southeast Lake Nipigon area represents the discharge of the Jellicoe spillway. It is considered that this spillway functioned during the lower, relatively short-lived level of glacial Lake Kelvin.

There are numerous areas exhibiting lacustrine (lake bottom) deposits from glacial Lake Kelvin which are susceptible to erosion and are generally associated with the major rivers that drain into the lake. These are most evident in the north end of the lake from the Whitesand River eastward, notably in Windigo and Ombabika Bay areas. These layered sands, clays and silts from the bottom of glacial Lake Kelvin are well exhibited

The major glacial events of the study area are marked by four moraines – the Kaiashk, Onaman, Nipigon, and Crescent moraines.

Figure 8 - Surficial Geology



Lake Nipigon Basin Surficial Geology

Location Map



Legend

- Primary Roads
- Railways
- Abandoned Shoreline
- Esker
- Talus Slope
- Escarpment
- Peat Lands
- Dunes
- Rivers
- Lakes
- Study Area Boundary



Scale 1:361,113

Source: MNR NRVIS Data
Datum: UTM, NAD83, Zone 16
Date: May, 2001

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in the banks of the Little Jackfish and Pikitigushi Rivers. These rivers carry considerable silt loads, resulting in sedimentation and deposition at the river mouths.

Numerous escarpment features also exist throughout the Nipigon Basin, particularly along the North Peninsula, the northwest shore, and south of Pijitawabik Bay and Forgan Lake. The formation of these escarpments was controlled by the thick horizontal diabase sills in these areas that were eroded in part by catastrophic drainage of glacial Lakes Agassiz and Kelvin.

Topography

The Nipigon Basin is enclosed on three sides by the higher lands of the Central Plateau and to the south by the Superior Section. The topography of the lake tends to be bedrock-controlled and varies from gently rolling to hilly and rugged. Since the area is covered with glacial till throughout, there are few visible outcroppings in the Lake Nipigon region, with the exception of the shoreline areas. Here, centuries of wave action have exposed bedrock and eroded cliffs and outcroppings into a broken rock shoreline.

In general, the north end of Lake Nipigon tends to exhibit weakly broken plain and is gently rolling to moderately hilly. By contrast, the west shore of Lake Nipigon, Black Sturgeon Bay and the Pijitawabik Bay area and Livingstone Point exhibit strongly broken plains with steep to precipitous cliffs. These "table-top" hills (mesas), sheer cliffs and associated talus slopes were formed over the ages when overlying sedimentary rocks were eroded and glacially scoured down to the resistant diabase sills.

Generally the islands of Lake Nipigon do not show dramatic relief, with the few notable exceptions such as Inner and Outer Barn Islands, Undercliff Island, Hat Island and Locomotive Island. The highest elevation on the lake is Inner Barn Island, with the

maximum elevation of 425 metres above sea level, 170 metres above the level of Lake Nipigon.

Vegetative Communities

(Taken from North-South Environmental, 2001)

Forest

The Lake Nipigon Basin is located within the Boreal Forest Region, Nipigon Forest Section (Rowe, 1972) and Hills (1959) Site Region 3W. While Lake Nipigon itself is within the Boreal Forest Region; Nipigon River and the Black Sturgeon waterway lie within the transition zone between the Great Lakes St. Lawrence Forest and the Boreal Forest. Typically, better drained sites have a mixed forest cover composed of trembling aspen (*Populus tremuloides*), white birch (*Betula papyrifera*), white spruce (*Picea glauca*) and balsam fir (*Abies balsamea*), sometimes with admixtures of red (*Pinus resinosa*) and white pine (*Pinus strobus*) (OMNR 1982, 1986). In areas protected from fire, white spruce and balsam fir attain dominance. Jack pine (*Pinus banksiana*) is characteristic of dry uplands, while black spruce (*Picea mariana*) is common in lowland situations.

The predominance of mixed forest types over much of the Basin area forms a contrast with the typical boreal forest cover outside of the Basin. Mixed stands prevail in the southern half, and a blend of mixed and more typical coniferous associations occur in the northern half. Occurrences of white and red pine, black ash (*Fraxinus nigra*) and white elm (*Ulmus americana*) suggest a slight intrusion from the Great Lakes-St. Lawrence Forest Region (Noble, 1979). The pines have higher representation in the southern half of the Basin, and rapidly drop out farther north, where the climate is harsher. These more southern species generally occur as admixes within the mixed forest, however they may in some cases form the dominant tree cover in small or large stands (Noble 1979).

Most of the larger islands in Lake Nipigon are forested, while smaller islands are typically bare rock with limited vegetation occurring in sheltered crevices. The present forest cover originated after fires swept the area almost 150 years ago (Nolan 1970, Gollat 1976). Dominant species on the northern islands are black spruce, white spruce and balsam fir. Gollat (1976) also observed scattered mature and overmature stands of trembling aspen and some isolated jack pine. A few small, overmature jack pine stands occur on Shakespeare Island and Geikie Island. The more humid climate and decreased frequency of fires on the islands result in conditions that are conducive to the development of older forest stands, in which the recruitment of young trees is much reduced and a broken canopy characteristic of old growth forests develops.

Wetlands

Extensive open wetland communities are located throughout Lake Nipigon on the protected bays, including open water, graminoid (sedge and grass) and meadow marshes. These wetland communities tend to exhibit strong patterns of zonation from deep to shallow areas. Open water marshes include submerged pondweeds (*Potamogeton* spp.), bullhead lily (*Nuphar variegata*) and water milfoil (*Myriophyllum* spp.). In shallower water, emergent plants such as wool-grass (*Scirpus cyperinus*) and softstem bulrush (*Juncus validus*) form graminoid marshes. At the water's edge the graminoid marshes are dominated by species such as beaked sedge (*Carex utriculata*), slender sedge (*Carex lasiocarpa*), and water horsetail (*Equisetum fluviatile*).

Riparian wetlands along the rivers that drain into Lake Nipigon generally show a zonation pattern from deep fast moving water to slow water areas to flood plains that are only seasonally flooded. The faster moving open water areas along rivers are dominated by submerged pondweeds (*Potamogeton* spp.), while slow moving waters can also have bullhead lily (*Nuphar variegata*) and common coontail (*Ceratophyllum demersum*). Emergent marshes

dominated by spike-rush (*Eleocharis* sp.) and sedges (*Carex* spp.) are present in small pockets along the edges of meanders where water movement is slower. Meadow marshes are located at the edge of riverbanks and at river mouths where flooding is common. These marshes are dominated by Canada blue-joint, broad-leaved cattail (*Typha latifolia*), and sedges often including beaked sedge and aquatic sedge (*Carex aquatilis*). Along riverbanks in areas that are only seasonally flooded, thicket swamps occur, which are dominated by a mixture of speckled alder (*Alnus incana* ssp. *rugosa*), willow (*Salix* spp.) and red-osier dogwood (*Cornus stolonifera*). Thicket swamps also occur on raised beach ridges that run parallel to the Lake Nipigon shoreline.

Within the Lake Nipigon Basin, fens are not a common vegetation community, only occurring inland along creeks, small rivers and at the edge of smaller lakes. Like other wetlands, fens tend to follow a distinctive pattern inland from deep water. Typically, open floating mat fens are present along the water's edge, followed by low shrub fen further inland where the peat mat is anchored, and finally a treed fen consisting of black spruce and shrubs at the outer edges. Pools and small channels within the fen support small populations of submergent marsh species, most commonly bladderwort (*Utricularia* spp.), pondweed, and bullhead pond lily.

True bogs, although common in the boreal forest, are extremely rare in the Lake Nipigon Basin, occurring only in locations where there is sufficient peat. *Sphagnum* moss forms hummocks that support shrubs such as Labrador-tea (*Ledum groenlandicum*), leatherleaf, bog rosemary, bog laurel and small cranberry. Bogs are typically very species poor, supporting only a limited flora due to the lack of nutrient rich water. Black spruce and tamarack can occur as well, ranging in numbers from a few scattered individuals to concentrations high enough to form a closed canopy.

Beaches

Narrow sand beaches are present along the Lake Nipigon shoreline and islands as well as on some of the inland lakes. Beach flora is predominantly Canada blue-joint, Baltic rush (*Juncus balticus*) and sedges. Shallow water extends out over the sand substrate away from the shore. Submerged plants occur in varying frequency in these shallow waters including pondweed (*Potamogeton* spp.) and northern water milfoil (*Myriophyllum sibiricum*).

Rock Barrens/Cliffs/Talus Slopes

Rock barrens, cliffs and talus slopes are found throughout the Basin. These sites often have features resembling arctic tundra ecosystems including northern or eastern exposures, low annual temperatures, extreme temperature amplitudes, high humidity, a lack of tree cover (and competition from trees and shrubs), and long hours of sunlight. As a result, these areas also tend to have a high concentration of arctic-alpine disjunct species. Typical flora of rock barrens includes a layer of lichens, sedges, low sweet blueberry, velvet-leaf blueberry, and rock cranberry (*Vaccinium vitis-idaea* ssp. *minus*). Vegetation of exposed bedrock beaches along the Lake Nipigon shoreline typically includes lichens, rushes (*Juncus* spp.), goldenrod (*Solidago* spp.), cinquefoil (*Potentilla* spp.) and balsam poplar seedlings.

Cliffs have scattered pockets of vegetation concentrated on ledges and in crevices. Typical species can include lichens and mosses as well as fragrant wood fern (*Dryopteris fragrans*), rock polypody (*Polypodium virginianum*), and northern beech fern (*Phegopteris connectilis*). In sheltered areas stunted black spruce and white birch can be found. The unstable boulder talus at the toe of the slope can vary from bare rock, covered only by crustose lichens and mosses with sparse herbs growing in crevices and soil pockets, to deciduous white birch stands. More stable talus slopes can support white cedar mixed wood communities.

Sand Dunes/Bluffs

Open dunes and bluffs are fairly common throughout the Lake Nipigon Basin. These communities typically have only scattered areas of vegetation interspersed with large areas of bare sand. Where vegetation is present, lichens (*Cladonia rangiferina*, *Cladonia stellaris*, *Cladonia mitis*, and *Stereocaulon* spp.) dominate. Other common species include bearberry (*Arctostaphylos uva-ursi*), spreading dogbane (*Apocynum androsaemifolium*), rocky mountain fescue (*Festuca saximontana*), slender mountain-rice (*Oryzopsis pungens*) and white-grained mountain-rice (*Oryzopsis asperifolia*).

In addition, in the Windigo Bay Nature Reserve, treed dunes in the northwest corner of the park grade into a sand plain in the south. This area is composed largely of an open jack pine forest with a ground cover dominated by feathermoss and lichens. Where moister conditions are present between the dunes, black spruce is found in association with jack pine. The understorey here is composed of Schreber's moss (*Pleurozium schreberi*), low sweet blueberry (*Vaccinium angustifolium*), velvet-leaf blueberry (*Vaccinium myrtilloides*) and green alder (*Alnus viridis* ssp. *crispus*).

Fire History

The present forest cover in the Lake Nipigon Basin originated after fires swept the area almost 150 years ago (Gollat 1976). More recent fires, occurring between 1920 and 1990 show a patchy distribution in the Basin, both in time and in location. As a result these scattered fires have had a small impact on the vegetation in the Basin as a whole. In areas that have experienced recent fires the forest vegetation tends to be dominated by deciduous species such as trembling aspen and white birch.

Fires ranging in size from 5 km² to 20 km² occurred throughout the Lake Nipigon Basin in the 1940s and 1950s. The largest of these were located north of Beardmore, west and northeast of Gull Bay, southeast of Orient Bay and between McIntyre Bay and Black Sturgeon Lake. In the 1990s a fire burned an area larger

In areas that have experienced recent fires the forest vegetation tends to be dominated by deciduous species such as trembling aspen and white birch.

than 20 km² west of the Kabitotikwia River. In addition to these larger fires a number of small fires occurred frequently between 1976 and 1999 along the CN railway adjacent to Pijitawabik Bay and Orient Bay.

Two significant fires burned in the spring of 1999, Nipigon 10 and 12, near the Black Sturgeon Lake and Beardmore areas. Nipigon 10, east of Black Sturgeon Lake, burned a total area of 50,540 ha, but consisted of many smaller patches with unburned areas in between. Nipigon 12 burned an area of 30,070 ha starting at McDiarmid and burning north and east to Mungo Park Point.

In the current fire management strategy for the Northwest Region MNR, the islands of Lake Nipigon are zoned extensive; meaning that fires occurring on the islands will be monitored and will be actively fought if there is any threat to human safety or physical structures. The shorelines of Lake Nipigon as well as the other protected areas in the Basin are zoned intensive, meaning that fire suppression activities will be implemented to ensure human safety and protect forest resources and infrastructure (D. Manol, pers. Comm.).

Flora

(Taken from North-South Environmental, 2001)

There are a total of 675 vascular plant species documented for the Lake Nipigon Basin (not all are verified). Of these only 85 (12.6%) species are considered to be non-native, a very low percentage when compared with the high percentage of non-native plants in Ontario's flora as a whole (37%, Kaiser 1983). The majority (33%) of the non-native species can be found in highly disturbed areas such as along roadsides and railways, open fields, and burns.

Total number of species found in forests, wetlands, beaches, rock barrens/cliffs/talus slopes, dunes/bluffs and successional areas are listed in Table 5. Also listed are the numbers of species that are exclusive to each habitat

It is important to note that although wetlands comprise less than 2% of the land base, they contain the largest proportion of the plant species biodiversity. Nipigon Basin is approximately 23% wooded and 75% open water with the remaining 2% of the land composed of wetlands, dunes, beaches, rock barrens and successional communities. While these communities occupy a tiny fraction of the landscape, they support a disproportionately large percentage of the floral diversity.

Table 5: Plant Species Diversity by Vegetation Type in the Lake Nipigon Basin

<i>Plant Community</i>	<i>Total Number of Species</i>	<i>Number of Species Exclusive to the Habitat</i>	<i>Proportion of Species Exclusive to the Habitat (%)</i>
Forest	222	59	26.6
Wetland	376	176	46.8
Beach	177	25	14.1
Rock Barren	146	44	30.1
Dune/Bluff	61	9	14.8
Successional	189	72	38.1

Source: North-South Environmental, 2001

Significant Species

There are 32 vascular plant species with arctic-alpine affinities documented from the Lake Nipigon Basin (Newmaster *et al.*, 1998; Thunder Bay Field Naturalists, 1998).

Examples of these species include northern fir-moss (*Hyperzia selago*) at Reflection Lake; alpine cliff fern (*Woodsia alpina*) at Orient Bay; and Hudson Bay eyebright (*Euphrasia budsoniana*) at Livingston Point (Figure 9).

Lake Nipigon Basin is home to 18 provincially significant vascular plant species (seven of which require confirmation). Examples include limestone oak fern (*Gymnocarpium robertianum*) at Blackwater River and Reflection Lake; showy oxytrope (*Oxytropis splendens*) on Prince of Wales Island and bog adder's-mouth (*Malaxis paludosa*) at Kabitotikwia River (Figure 9).

Fifty-seven of the vascular plant species documented are considered to be regionally significant (six of which need to be confirmed). A number of these regionally significant species are considered to be at the "edge" of their range including round-lobed hepatica (*Anemone americana*), sandbar willow (*Salix exigua*), graceful sedge (*Carex gracillima*) and bulbet bladder fern (*Cystopteris bulbifera*). Large concentrations of these species occur in areas with warmer microclimates, typically sheltered bays along the southeastern shore of Lake Nipigon (e.g., Forgan Lake, Orient Bay) (Figure 9).

Wildlife

The distribution of wildlife species in the Nipigon Basin has changed in the past one hundred years as a result of over-hunting, climate change, and habitat loss, in particular the loss of unfragmented and older successional forests. Logging and fire suppression has had the greatest impact on the landscape. Large predators such as cougar, wolverine and ungulates such as woodland caribou, all of which require large home ranges, have been most affected.

The wildlife of the Lake Nipigon Basin is typical of the boreal forest and transition forest habitat of the Canadian Shield, but it is also a unique area of species and subspecies overlap (Thompson, 2000; North-South Environmental, 2001). Eastern and western species' ranges overlap as well as northern and southern ranges.

The preservation of species populations at the edge of their ranges is important to maintaining genetic diversity within a species, which in turn is critical to the species survival. The Lake Nipigon Basin, although low in species number (Thompson, 2000), is likely high in genetic diversity and is therefore an important area for many species. Also, due to a lack of development and access, rare species that require remoteness and have been suffering from range reduction, have been able to persist in the Basin (woodland caribou) or have expanded populations here (American pelican, Bald Eagle).

Of the over 200 higher order wildlife species (52 mammals, 150 birds, 9-18 reptiles and amphibians) that are known to occur in the Nipigon Basin, a number are considered to be species at risk. Three of these species (caribou, eagle, pelican) have stable or expanding populations in the Basin. Of the 150 bird species known to breed in the Basin, only 3 species are introduced and occur in very low numbers near the limited settlement areas (House sparrow, Rock Dove, European starling). Butterfly, moth and insect species distribution has not been well documented and only limited information is available.

Butterflies and Moths

Little is known of the insects, butterflies and moths of the Nipigon Basin area. Harris and Foster (1997) provide an "incomplete, preliminary" list of 22 butterflies and 10 moth species found during 23 person days of field work in May and June, 1997 in Windigo Bay Provincial Park. They suggest the butterfly list is a reasonably good sampling of early summer species found in the park. The moth list is a

Logging and fire suppression has had the greatest impact on the landscape. Large predators such as cougar, wolverine and ungulates such as woodland caribou, all of which require large home ranges, have been most affected.

small sampling of mainly day flying moths. The most commonly occurring butterfly was the Tiger swallowtail (*Pterourus glaucus canadensis*), while the most significant butterfly species was a Grizzled skipper (*Pyrgus centaureae*), a northern species at the southern edge of its range. It is known from only a few locations in the northeast portion of Thunder Bay District (Nick Escott, pers. comm. and Holmes et al, 1991 in Harris and Foster, 1997).

Bird and Hale (1994), Nick Escott (1995), and Chris Sanders, who conducted field studies from 1960 through 1968 at Black Sturgeon Lake, have compiled three different lists of moth and butterfly species within the Nipigon Basin area. The three lists vary in terms of the number of species they include, by as much as six hundred. More inventory work is required to accurately identify the moth and butterfly species present in the Basin.

The eastern population of the Monarch butterfly, considered a "species of special concern", includes the Nipigon Basin in its habitat range. This species depends on early successional habitat that supports milkweed (essential to its life cycle) and wildflowers. It has suffered habitat loss and degradation due to human disturbance and pesticides. A monarch butterfly was sited in a small clearing on the shore of Lake Nipigon (Northern Bioscience, 1997)

Reptiles and Amphibians

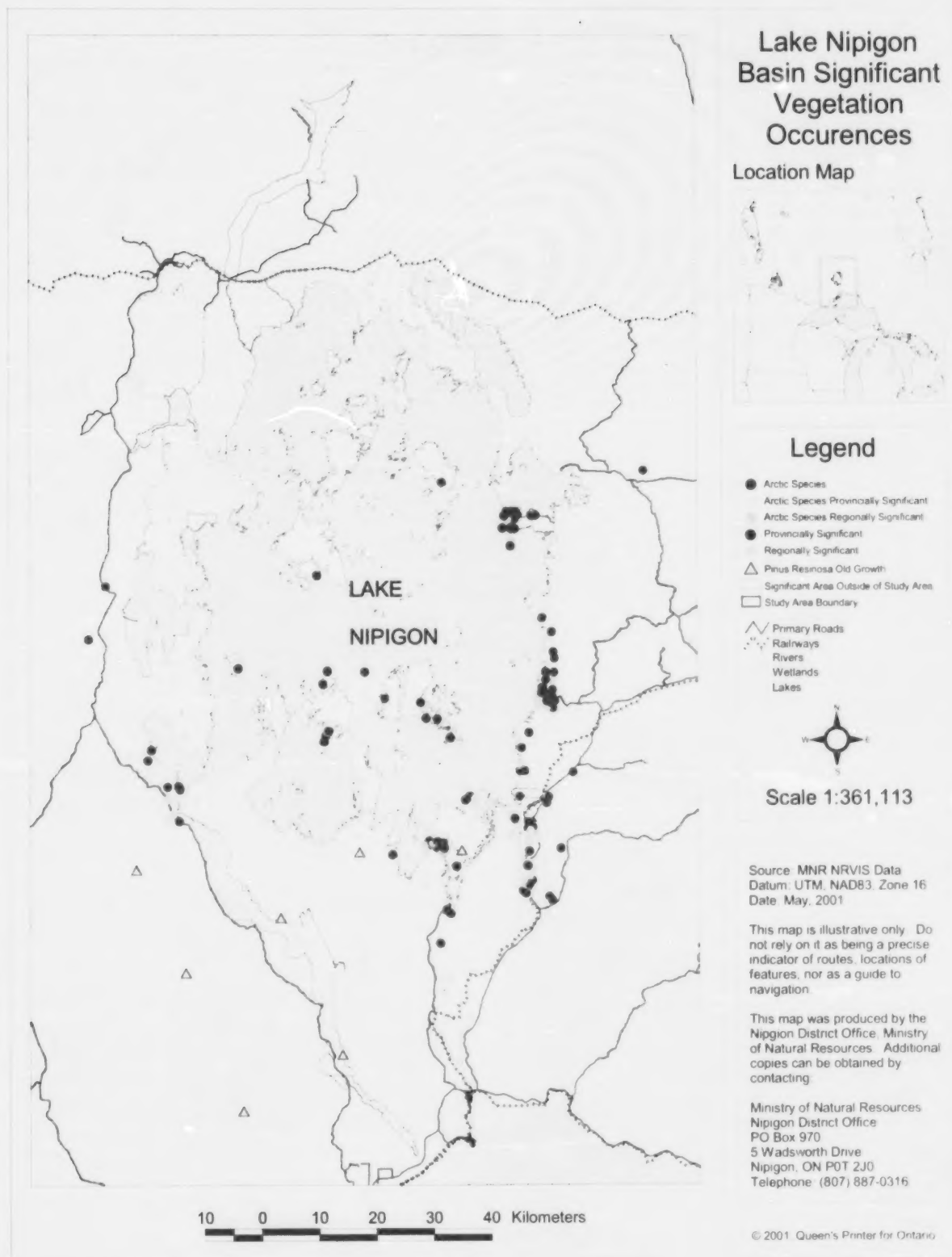
Although very little inventory work has been done, research shows that between 5 (Thompson, 2000) and 18 (North-South Environmental, 2001) species of reptiles and amphibians exist in the Nipigon Basin. Since a portion of the Basin falls within the transitional forest, many of the species are at the northern limit of their range. Table 6 identifies the species listed by North-South Environmental (2001), where 15 of the 18 species have actually been observed in the study area.

Table 6: Reptiles and Amphibians in the Nipigon Basin

<i>Common Name</i>	<i>Scientific Name</i>	<i>Observed In Basin</i>
Common Snapping Turtle*	<i>Chelydra serpentina</i>	No
Western Painted Turtle	<i>Chrysemys picta belli</i>	Yes
Eastern Garter Snake	<i>Thamnophis sirtalis</i>	Yes
Northern Redbelly Snake*	<i>Storeria occipitomaculata</i>	No
Mudpuppy	<i>Necturus maculosus</i>	Yes
Eastern Newt	<i>Notoptbatmus viridescens</i>	Yes
Blue Spotted/Jefferson Salamander complex	<i>Ambystoma laterale/A. jeffersonianum</i>	Yes
Blue Spotted Salamander	<i>Ambystoma laterale</i>	No
Jefferson Salamander	<i>Ambystoma jeffersonianum</i>	Yes
Spotted Salamander	<i>Ambystoma maculatum</i>	Yes
Redback Salamander*	<i>Plethodon cinereus</i>	No
American Toad	<i>Bufo americanus</i>	Yes
Northern Spring Peeper	<i>Pseudacris crucifer</i>	Yes
Boreal Chorus Frog	<i>Pseudacris maculata</i>	Yes
Mink Frog	<i>Rana septentrionalis</i>	Yes
Green Frog	<i>Rana clamitans</i>	Yes
Wood Frog	<i>Rana sylvatica</i>	Yes
Northern Leopard Frog	<i>Rana pipiens</i>	Yes

* Occurrence of these species within the Nipigon Basin is questionable

Figure 9 - Vegetation/Flora



The most common herpetofauna in the Basin are the eastern garter snake, American toad, spring peeper and wood frog. Boreal chorus frog is also common to the area. Each of these species hibernates on land. The three frogs spend the winter under logs and leaf litter and are able to withstand freezing of a large proportion of their body tissues. The garter snake and toad burrow beneath the frost line in winter. The eastern garter snake is the only reptile occurring throughout the boreal forest and into the Hudson Bay Lowlands (Thompson, 2000).

The yellow-spotted, blue-spotted and Jefferson complex salamanders have all been reported in the study area (North-South Environmental, 2001). These salamanders are at the northern edge of their ranges. The Jefferson and blue-spotted salamanders are difficult to separate and much hybridization has occurred (Jefferson complex). There were early reports of these species by Dymond (1928). Recently (1991–1993) Thunder Bay Field Naturalists have reported the Jefferson and Jefferson complex salamanders on Ells Island, Lake Nipigon.

Three other frog species, mink frog, northern leopard frog and green frog are at the northern edge of their range. These three species are most likely limited in their northerly distribution due to their winter habitat requirement (substrate of ponds and lakes, or marshes). Ponds, lakes, and marshes in the Lake Nipigon Basin may freeze to too great a depth for the hibernating species winter survival.

The western painted turtle and the eastern newt were both observed by Dymond (1928) and are both observed today in the Orient Bay area (S. Carroll, pers. comm.). The western painted turtle also occurs in the Poplar Point - Standingstone Creek area on the east side of Lake Nipigon (A. Nyman, pers. comm.). There has been one occurrence of a mudpuppy in the Black Sturgeon River system observed in 1987 (MNR).

Breeding Birds

There have been 150 species of breeding birds noted within the Lake Nipigon Basin Signature Site, however, some of the species on this list are supported by general distribution maps only (North-South Environmental, 2001). Thompson (2000), on the other hand, lists 60–79 breeding bird species for the Basin. Obviously, more inventory work is required to better establish the actual occurrence of breeding birds within the Signature Site. Three “significant” breeding bird species are confirmed in the study area: American white pelican, bald eagle and great gray owl. Also the golden eagle, peregrine falcon, black tern and red-necked grebe, although not confirmed breeders in the area, have been sighted in the Basin.

American White Pelican

The American white pelican is classed by the Committee on the Status of Species at Risk in Ontario (COSSARO) as “Endangered” and is protected under Ontario’s Endangered Species Act. Pelicans were first observed on Lake Nipigon in the 1970s, but nesting was not documented until 1991 on Pretty Island in MacIntyre Bay (Bryan, 1991). This finding extends the North American breeding population of the white pelican 500 km to the east (Macins, 1991). In 1992, two other small islands to the west of Ombabika Narrows had nesting pelicans. In 1993, a breeding colony was established on a small island off Mt. St. John near Windigo Bay Provincial Park. In 2000, approximately 300 breeding pairs were observed on a small island north of Boles Island. It is unknown whether pelicans are still breeding on Pretty Island or the small islands west of Ombabika Narrows. Cormorants and great blue herons were also nesting on these islands (B. Ratcliff, pers. comm.).

Pelicans require isolation for breeding, which is what makes the Nipigon Basin an attractive location. They nest on small (0.4 to 1.2 ha), remote, bedrock islands, sparsely vegetated with grasses, nettles, and smartweed, or more thickly covered with high shrubs and trees (Peck and James, 1983). They nest once a year in May or

Although a rare sight in most of its' Ontario range, the bald eagle can be seen frequently along the cliffs and shorelines of the Lake Nipigon Basin.

early June, on islands free from human disturbance (Peck, 1987). They normally lay two eggs, however, generally only one young fledges from a nest, sibling rivalry often killing the other chick within 2 weeks of hatching (Koonz, 1987).

Breeding colonies may be destroyed by predators such as fox or mink however, the major source of destruction is human disturbance during the nesting and fledging periods (Koonz, 1987). During the initial stages of reproduction, one or two human visits to a colony can cause the adults to desert for the year and repeated harassment can cause abandonment for one or more years. Young less than 2 weeks old are featherless and extremely vulnerable to cold (Van Scheik 1985, Evans 1984) or intense sunlight (McLeod and Bondar 1953). Human disturbances of as little as 20 minutes on clear, hot days will kill nearly all unshaded chicks under 2 weeks of age (Koonz, 1987).

Pelican feeding areas must be within 150 km of the nesting site for reasonable survival of the young (Macins, 1991). Shallow lakes, bays or marshes provide optimum feeding habitat. Key feeding areas on Lake Nipigon include West Bay, Wabinoosh Bay and Wabinoosh River, Windigo Bay, Ombabika Bay and the mouth of most tributaries. The pelican survives mainly on fish of little commercial value, such as stickleback and suckers, and will also occasionally eat crayfish or salamanders. An adult pelican consumes, on average, 1.8 kg of food daily. It is believed that pelicans migrated to Lake Nipigon as a result of the smelt introduction and population explosion in and since the 1970s.

Bald Eagle

The bald eagle is a species at risk in Ontario and is classed as "Endangered" by COSSARO. Although a rare sight in most of its' Ontario range, the bald eagle can be seen frequently along the cliffs and shorelines of the Lake Nipigon Basin.

It suffered a population decline during the mid to late sixties and early 1970s due to the fish portion of their diet containing toxic chemicals (DDT and PCB) (Postupalsky, 1971). Their numbers have since grown dramatically on Lake Nipigon from 14 nests which only produced one eaglet in 1970 (Postupalsky, 1971), to 70 nests in 1993, to over 140 nests in 2001 (R. Swainson, pers. comm.).

In the fall, on the Nipigon River, large numbers of eagles congregate to feed on spawning chinook salmon. Counts, conducted on the river since 1989 have grown from a maximum of 26 birds at one time in the early 1990s to a high of 60 eagles during the fall of 2000 (R. Swainson, pers. comm.). Along the Black Sturgeon waterway, 4 eagle nests were observed in 1990 and 7 nests in 2001.

In the Lake Nipigon Basin, eagles are known to nest almost exclusively in large poplar trees. Nests are generally below treetops to provide shade, yet nest trees generally protrude above the rest of the forest canopy.

Peregrine Falcon

Peregrine falcons are a species at risk in Ontario and are classified as "Endangered" by COSSARO. Eggshell thinning, due to DDT and PCB poisoning, resulted in a serious and rapid decline in the numbers of new recruits to breeding populations, beginning in the 1940s, and continuing to the late 1970s. Since the late 1970s, programs (Project Peregrine) throughout Ontario have successfully reintroduced the peregrine falcon to the wild. A reintroduction program was initiated along the Nipigon River in 1991. In 1991, one breeding pair was noted nesting near the Nipigon River mouth, just outside the study area and has nested there each year since. (R. Swainson, pers. comm.). There are now over 50 pairs of peregrines nesting in Ontario, many along the north shore of Lake Superior.

Peregrines nest on high cliffs near vast open areas such as lakes or grasslands and have been observed and photographed (Thunder Bay

Field Naturalists, 1991-1993) on Lake Nipigon near suitable nesting habitat (Tichnor Island), however, nesting in the Basin has not been confirmed (Ratcliff, pers. comm.). Many potential nest sites exist in the Basin and have been mapped.

Black Tern

Black terns are a species at risk in Ontario and are ranked as "Vulnerable" (NHIC, 2001). A flock of 19 black terns was observed in June 1991 by Thunder Bay Field Naturalists (Bryan, 1991) but there was no evidence of nesting. Black tern populations appear to be declining due to habitat loss and fragmentation. Black terns require large wetlands greater than 5 ha. Wetlands are not widespread on Lake Nipigon but suitable nesting habitat is available.

Great Gray Owl

The great gray owl is not listed as a species at risk in Ontario. It is, however, tracked by the Ministry of Natural Resources, Natural Heritage Information Centre because it is an indicator species of extensive mature coniferous forest. The great gray owl has been observed during nesting season near Jessie Lake, along the Nipigon River (R. Swainson, pers. comm.) as well as on Lake Nipigon near Wabinosh Bay (T. Carroll, pers. comm.). There are no confirmed reports of nesting, though suitable habitat exists in the Lake Nipigon Basin.

Golden Eagle

The golden eagle is a species at risk in Ontario and is ranked as "Endangered". Although sightings have been rare in the planning area, golden eagles have been recently observed in the Armstrong area (Armstrong, pers. comm.). During recent (2000) peregrine falcon surveys, a possible golden eagle nest was observed on a cliff in EMA-2257r northwest of Lake Nipigon, but no birds were observed.

Red-necked Grebe

The Red-necked Grebe is considered a bird at risk in Ontario, with a COSEWIC status of S3B. This bird has been reported along the Nipigon River, however, nesting has not been observed

(Brian Ratcliff pers. comm. in North-South Environmental, 2001). Suitable habitat (large marshes) does exist in the extreme south of the Signature Site in Forgan Lake and Lake Helen.

Osprey

Osprey populations declined in the 60's and 70's due to reproductive impairment caused by DDT, loss of breeding habitat, and shooting. Populations have now recovered somewhat, particularly since DDT was banned. On Lake Nipigon, these fish hawks are less numerous than the larger bald eagle. On Lake Nipigon, osprey numbers recovered from 8 nests in 1971 to 40 nests in 1993. In 2001 however, only 17 nests were located on the lake. This decline is likely the result of the corresponding doubling of bald eagles nests that has occurred during the same time period. Bald eagles are usually dominant over ospreys, ousting them from their nests and stealing fish from them. This forces osprey out of some territories (Environment Canada, 1994).

Osprey also nest along the Black Sturgeon River where 3 nests were observed in 1990. Only 1 nests exists on the waterways as the other 2 were burnt during a forest fire.

Other Species of Interest

A few other species that require special mention include the double-crested cormorant, great blue heron, herring gull and the osprey, all specialized in fishing.

The first double-crested cormorant colony observed on Lake Nipigon was on Logan Island in the 1920's. Throughout the 1960s and 1970s, an 86% decrease in double breasted cormorant population size occurred due to the effects of DDT, and some colonies disappeared altogether. With the banning of DDT, cormorants have made a comeback. During surveys in 1991 and 1992, over 5,000 cormorants, and 15 nesting colonies containing a total of 2,500 nests were counted on Lake Nipigon (Escott and Bryan, 1993).

*Three mammal
"species at risk"
occur or have been
observed in the
Lake Nipigon
Basin, the woodland
caribou, cougar,
and wolverine.*

Herring gulls are often seen cohabiting with white pelicans and double-crested cormorants on the islands of Lake Nipigon. Habitat on Lake Nipigon also includes nesting on rock outcrops along steep cliff faces as noticed on Outer Barn Island. The gulls follow the commercial fishing boats and feed voraciously on fish offal (Waters, 1987), a factor that may have contributed to their increase.

The Thunder Bay Field Naturalists recorded five heronries on various islands on Lake Nipigon in July 1992. During the winter of 2000, another heronry was observed on the mainland in McIntyre Bay. Within the Lake Nipigon Basin planning area (the lake itself, surrounding lakes in the Basin, or the Black Sturgeon or Whitesand waterways) the number of rookeries, nests, and individuals are unknown (R. Swainson pers. comm).

Mammals

Reporting on field work conducted in 1901, the geological surveyor A.W.G. Wilson wrote:

"that in the country west of Nipigon Lake and River large game (moose cariboo (sic) and black bear) seem to be abundant. During the summer, members of our party saw, besides the above animals, otter, fisher, mink, beaver, muskrats and foxes. Marten and lynx are also taken by the Indians" (Wilson, 1902).

North-South Environmental (2001) reports fifty-two mammal species occurring in the Lake Nipigon Basin area, whereas, Thompson (2000) reports 30 to 39 species. Again, further inventory is required to establish accurate mammal species numbers. As noted above, several mammal species in the Lake Nipigon Basin Signature Site are at the northern limit of their range including: white-tailed deer, long-tailed weasel, bobcat, several shrews (short-tailed shrew and smoky shrew), hairy-tailed mole and the eastern chipmunk. There are also several species at the southern limit of their range including caribou, wolverine,

cougar, American marten, fisher, northern flying squirrel, and arctic shrew (Burt and Grossenheider, 1976). As noted above, there is subspecies overlap to the east and west (Thompson, 2000). For example, short-tailed shrew, red squirrel, woodland jumping mouse, eastern chipmunk, raccoon, ermine and moose have two recognizable subspecies in the Lake Nipigon area (Banfield, 1977 in North-South Environmental, 2001).

Little is known about many of the smaller mammals, especially the bats, mice, voles, shrews, or other rodents within the Basin. Knowledge of these species is important since many of these smaller mammals are the prey species upon which other "larger" mammals, owls, and raptors depend.

Three mammal "species at risk" occur or have been observed in the Lake Nipigon Basin, the woodland caribou, cougar, and wolverine. All three of these species require large home ranges in isolated areas with minimal human disturbance. Within the Basin, the woodland caribou is the most extensively studied of the three.

Woodland Caribou

Woodland caribou (*Rangifer tarandus*) have recently been re-categorized by the National Committee on the Status of Endangered Wildlife in Canada (COSEWIC) from "vulnerable" to "threatened". Prior to the 1850s, caribou were generally widespread across the tundra and boreal forest (Banfield, 1977). Since this time, caribou have retreated to the northern half of the Lake Nipigon Basin (Bergerud, 1974). Numerous theories have been proposed to explain this decline including habitat destruction, predation and over-hunting. As a response to declining caribou numbers, legal hunting for caribou was closed across Ontario in 1929 and remains closed today. This closure did not stabilize or increase populations as anticipated (Devos and Peterson, 1951; Cringan, 1957). It was then believed that the northward expansion of logging into what remained of caribou habitat had, and would

continue to cause their decline (Cumming and Beange, 1987). Another detrimental influence on the caribou population was determined to be the meningeal brainworm carried by the northward expanding population of white-tailed deer circa early 1900s.

Caribou summer on the islands of Lake Nipigon, swimming there after spring break-up to have their calves where they are relatively free from wolf predation. They seem to use the small to mid-sized islands, ranging from 0.5 ha to 1550 ha, but prefer those between 25 to 75 ha in size, much as moose do. Most caribou return to the mainland to spend the winter, although some spend the winter on the islands. Mainland wintering areas include Armstrong, Wabakimi, Ogoki reservoir and Onaman Lake areas (Hyer, 1997). The number of animals over-wintering on the islands is increasing (J. Adams, pers. comm.) This has occurred concurrently with increased logging activity in the traditional wintering areas. (R. Swainson, pers. Comm.)

Historically caribou used all of the islands on Lake Nipigon. It is thought that for the most part, caribou now use the islands in the northern half of Lake Nipigon, however, they have been observed in locations further south. Cumming and Beange (1987) found caribou as far south as Gillespie and Rodger Islands. Hyer (1997) collared caribou from no further south than Birch Island, just north of Jackfish Island. Some sightings have been recorded as far south as South Bay (between 1956-1960), but none have been reported that far south since (Gollat, 1975). More recently, T. Carroll (pers. comm. 1993) reported that caribou droppings and tracks have been found as far south as Anderson Islands, Wilson Island and Blacksmith Island. During winter 2001 aerial surveys, caribou were observed on Jackfish Island and Caribou Island. Caribou signs were noticed west of English Bay near Kettle Lake and on the mainland near Mungo Park Point (R. Swainson, pers. comm.). Caribou tracks were also observed on the ice near Kelvin Island (J. Adams, pers. comm.).

The diet of the caribou includes lichens of mature conifer forests, especially during the winter. These include both tree lichens growing on spruce, jack pine, and balsam fir such as "old man's beard" (*Usnea* spp.), and ground lichens "reindeer moss" (*Cladonia* spp.) (Hyer, 1997). During summer, woodland caribou browse on herbs and deciduous leaves.

Eastern Cougar

The cougar (*Felis concolor*) is classed as "Endangered" in Ontario (COSSARO) and is protected under Ontario's Endangered Species Act. Historically, the cougar was well distributed all across Ontario in relation to deer, its chief prey. Due to early persecution by European settlers, cougar has virtually disappeared in eastern Canada.

Lake Nipigon and Nipigon River area is considered a "hotbed" for cougar sightings, with 150 sightings reported between 1948 and 1998. Recent sightings have occurred along the Black Sturgeon River and Eskwanonwatin Lake (R. Dupuis, pers. comm.) as well as between Beardmore and Lake Nipigon (P. Odorizzi, pers. comm.). Though many sightings have occurred, none have been verified. Cougar inhabit extensive forests, have large territories and exist at very low densities even where populations are well established. They are intolerant of human disturbance. Cover, in the form of vegetation and broken topography, is more important to cougars than any particular vegetation type (Environment Canada, 2001). This topographic requirement is characteristic of the terrain within the Lake Nipigon Basin.

Wolverine

The wolverine (*Gulo gulo*) is ranked as "Vulnerable" in Ontario. This species requires large undisturbed tracts of forest and is intolerant of human disturbance. Its population in Ontario is thought to be in the hundreds (ROM and OMNR, 1999). Historically, it was widely distributed across the Lake Nipigon Basin but its range has since receded to the extreme northwest corner of Ontario, north of Red Lake (Dawson, unpubl.).

Cougar inhabit extensive forests, have large territories and exist at very low densities even where populations are well established. They are intolerant of human disturbance.

There are scattered records of wolverine sightings around the Nipigon River and Lake Nipigon (North South Environmental, 2001). In the mid 1980s, a wolverine was observed using a den near Gros Cap on the shore of Lake Nipigon (P. Odorizzi, pers. comm.).

Moose

Information indicates that moose are relatively abundant in the Lake Nipigon Basin as they have been since the early 1900s (Wilson, 1902). Moose browse on leaves and aquatic plants in summer and twigs and buds in winter. They thrive on early successional vegetation caused by disturbance such as fire, logging and budworm infestations. Unlike caribou, moose are solitary in nature and rarely travel in groups. A number of factors have favoured the moose population in the last half century including: increase in habitat due to forest disturbance, reduced wolf predation due to wolf hunting in the 1950's to 70's; and the creation of the Lake Nipigon Islands Crown Game Preserve (1957-1965), which protected the moose population from hunting (Gollat, 1975). Currently, with the exception of areas where sheer cliffs dominate, moose utilize much of the river corridors, shorelines and woodlands throughout the mainland and islands of the Nipigon Basin. The Nipigon District MNR winter 2001 aerial moose survey resulted in an estimate of 110 moose on the Lake Nipigon Islands.

Other Mammals of Interest

Similar to the moose, white-tailed deer reached areas north of Lake Superior circa 1900s. Deer are present in the southerly reaches of the Nipigon Basin, west of the Nipigon River, and in the Black Sturgeon area's lake-edge forests. Deer's inability to tolerate extreme cold and deep snow limit the number of deer in the Basin area.

Wolves are the primary predators of caribou, moose, and white-tailed deer. Although highly persecuted through wolf hunts and bounties from the 1950s to 1970s, the wolf is still common in the Nipigon Basin today. At least one wolf pack has been seen on Shakespeare

Island and one pack in the Black Sturgeon River area. The wolves in the Basin are known to eat the fish/guts discarded on the ice by commercial fishermen. This may be resulting in artificially high wolf numbers and may also be alleviating predator pressure on other species such as caribou

Fish (Taken from Swainson, 2001a)

The fish community of the Lake Nipigon Basin is dominated by trout (salmonids) and whitefish (coregonids), which is typical of post-glacial landscapes dominated by deep, cold, nutrient poor, oligotrophic (cold water) lakes. Approximately 50 fish species belonging to thirteen families occur in the planning area. Of these, only nine are non-native species that have been deliberately (e.g. pacific salmon, rainbow trout) or accidentally (smelt) introduced. Six of these species (sea lamprey, alewife, pink, coho, chinook salmon and rainbow trout) only occur in the lower part of the Nipigon River and Black Sturgeon River. Only three non-native species (smelt, brown trout and black bullhead) occur in the rest of the Basin.

Lake Nipigon

Lake Nipigon is a large, deep oligotrophic lake whose extensive and varied shoreline provides a variety of habitat for both warm and cold water species. Barriers to movement on the Nipigon River have prevented most of the non-native species now present in Lake Superior from reaching Lake Nipigon. Despite the recent (1976) establishment of smelt, Lake Nipigon remains much as it was when first studied nearly a century ago.

A comparison of Lake Nipigon fish species found by Dymond in 1926 (34 species) with those found today (45 species) (Table 7) shows only a few notable differences. Brown trout, reportedly introduced into the Whitesand River, occur only rarely in the lake. Black bullheads were introduced into Hynrick and Leonard Lakes, near MacDiarmid and are now

found in Orient Bay. Many of the "extra" species such as bloater, shortjaw cisco and finescale dace were likely present in 1926 but not encountered due to survey techniques.

The deep, cold, well-oxygenated, unpolluted water found in Lake Nipigon is required by cold water species such as lake trout, brook trout, members of the whitefish and cisco families and some sculpins. This rare habitat has enabled species at risk, such as the shortjaw cisco and deepwater sculpin, both ranked as "Threatened" by the Committee on Status of Endangered Wildlife in Canada (COSEWIC), to continue to inhabit Lake Nipigon (Houston, 1988; Parker, 1988).

In a report to COSEWIC on the ciscoes of Lake Nipigon, Turgeon and Bernatchez (2000) state "ciscoes are a devastated group of North American fishes whose remaining diversity constitutes a fish fauna heritage of obvious conservation value. Lake Nipigon is the only Laurentian Great Lake still inhabited by pristine Great Lakes fish fauna. Thus it offers an opportunity to document the integral and original biodiversity of the Great Lakes cisco fauna."

The exact number of cisco species living in Lake Nipigon has not been determined but is thought to be five, two of which are believed to be exclusive to this lake. The blackfin cisco (*C. nigripinnus*) was thought to be extinct everywhere except Lake Nipigon. It has recently been determined that the "Nipigon blackfin cisco" is a totally different species yet to be determined by taxonomists.

The cold water species of Lake Nipigon such as lake trout and brook trout are some of the fastest growing in Ontario and are famous worldwide for the large sizes that they reach. Ombabika, Chief, and Gull Bays provide the shallow, warm water habitat required by species such as walleye, sauger, northern pike, sturgeon, yellow perch, common white and longnose sucker. Brook trout, walleye and sturgeon populations are all in a degraded state

in Lake Nipigon. Recovery efforts have been initiated for walleye and brook trout. No plan currently exists for sturgeon.

Black Sturgeon River System

The Black Sturgeon River system provides a good mix of aquatic habitats with both warm, shallow and cold, deep lakes as well as river habitat ranging from long stretches of wild white-water rapids at the upper end, to kilometers of slow meandering river in the lower reaches.

Thirty species of fish are found in this system, of which nine are non-native. Under most flow conditions, the Black Sturgeon Dam, located just north of highway 11/17, is a barrier to migration for most species from Lake Superior. Upstream from the dam only 19 species occur; all except the rainbow trout (which occur in small numbers) are native. The deep dark coloured waters of Black Sturgeon Lake provide cold water habitat for the recently introduced lake trout and a few brook trout as well as lake whitefish and two cisco species.

Lake surveys of Black Sturgeon Lake and Eskwanonwatin Lake were conducted in 1977 and 1972 respectively. Fish species found are listed in Table 8 and with the exception of lake trout (recently introduced), the species present today are the same as were present 76 years ago when it was first studied by Dymond (1926). Smallmouth bass although rare in the area, are native to the Black Sturgeon River system.

The northern brook lamprey (*Ichthyomyzon fossor*) is found in the Black Sturgeon River above the Black Sturgeon Dam. It is a native non-parasitic species that does not move out to Lake Superior, but completes its life cycle in streams. They are ranked as species of "Special Concern" at the national level (COSEWIC) and as "Vulnerable" by the Committee on the Status of Species at Risk in Ontario (COSSARO).

*The Nipigon River
has long been
famous for the
quantity and size of
its brook trout.
Anglers have been
coming to the river
since the mid 1800s
to fish the
Nipigon waters.*

Table 7: Fish Species Present in Lake Nipigon, 1926 and 2001

<i>Common Name</i>	<i>Scientific Name</i>	<i>Dymond (1926)</i>	<i>MNR (2001)</i>
Lake sturgeon	<i>Acipenser fluvescens</i>	X	X
Brown trout	<i>Salmo trutta</i>		X
Brook trout	<i>Salvelinus fontinalis</i>		X
Lake trout	<i>Salvelinus namayacush</i>	X	X
Lake whitefish	<i>Coregonus clupeaformis</i>	X	X
Cisco (lake herring)	<i>Coregonus artedii</i> SP. *	X	X
Bloater	<i>Coregonus hoyi</i>		X
Blackfin cisco	<i>Coregonus nigripinnis</i> sp. *	X	X
Nipigon cisco	<i>Coregonus nipigon</i> sp. *	X	X
Shortjaw cisco	<i>Coregonus zenithicus</i>		X
Round whitefish	<i>Prosopium cylindraceum</i>	X	X
Rainbow smelt	<i>Osmerus mordax</i>		X
Northern pike	<i>Esox lucius</i>	X	X
Longnose sucker	<i>Catostomus catostomus</i>	X	X
White sucker	<i>Catostomus commersoni</i>	X	X
Silver redhorse	<i>Maxostoma anisurum</i>	X	X
Shorthead redhorse	<i>Maxostoma macrolepidotum</i>	X	X
Northern redbelly dace	<i>Phoxinus eos</i>		X
Finescale dace	<i>Phoxinus neogaeus</i>		X
Lake chub	<i>Couesius plumbeus</i>	X	X
Golden shiner	<i>Notemigonus crysoleucas</i>		X
Emerald shiner	<i>Notropis atherinoides</i>	X	X
River shiner	<i>Notropis blennius</i>	X	
Blacknose shiner	<i>Notropis heterolepis</i>	X	X
Spottail shiner	<i>Notropis budsonius</i>	X	X
Mimic shiner	<i>Notropis volucellus</i>	X	X
Fathead minnow	<i>Pimephales promelas</i>	X	
Longnose dace	<i>Rhinichthys cataractae</i>	X	X
Pearl dace	<i>Margariscus margarita</i>		X
Black bullhead	<i>Ameiurus melas</i>		X
Burbot (Ling)	<i>Lota lota</i>	X	X
Brook stickleback	<i>Culaea inconstans</i>	X	X
Ninespine stickleback	<i>Pungitius pungitius</i>	X	X
Trout-perch	<i>Percopsis omiscomaycus</i>	X	X
Smallmouth bass	<i>Micropterus dolomieu</i>	X	X
Yellow perch	<i>Perca flavescens</i>	X	X
Sauger	<i>Stizostedion canadense</i>	X	X
Walleye	<i>Stizostedion vitreum vitreum</i>	X	X
Iowa darter	<i>Etheostoma exile</i>	X	X
Johnny darter	<i>Etheostoma nigrum</i>	X	X
Logperch	<i>Percina caprodes</i>	X	X
Mottled sculpin	<i>Cottus bairdi</i>	X	X
Slimy sculpin	<i>Cottus cognatus</i>	X	X
Spoonhead sculpin	<i>Cottus ricei</i>	X	X
Deepwater sculpin	<i>Myoxocephalus thompsoni</i>		X

* Taxonomy uncertain

Table 8: Fish Species Present in Black Sturgeon Lake

<i>Common Name</i>	<i>Scientific Name</i>
Sturgeon	<i>Acipenser fulvescens</i>
White sucker	<i>Catostomus commersoni</i>
Spottail shiner	<i>Notropis hudsonius</i>
Emerald shiner	<i>Notropis atherinoides</i>
Lake whitefish	<i>Coregonus clupeaformis</i>
Lake herring (cisco)	<i>Coregonus artedii</i>
Nipigon cisco (Tullibee)	<i>Coregonus nigripinnis regalis*</i>
Nine-spined stickleback	<i>Pungitius pungitius</i>
Northern pike	<i>Esox lucius</i>
Smallmouth bass	<i>Micropterus dolomieu</i>
Walleye	<i>Stizostedion vitreum</i>
Yellow perch	<i>Perca flavescens</i>
Burbot (Ling)	<i>Lota lota</i>
Log perch	<i>Percina caprodes</i>
Johnny darter	<i>Etheostoma nigrum</i>
Trout-perch	<i>Percopsis omiscomaycus</i>
Slimy sculpin	<i>Cottus bairdi</i>
Brook trout	<i>Salvelinus fontinalis</i>
Lake trout	<i>Salvelinus namaycush</i>

* *Taxonomy uncertain*

Nipigon River

The Nipigon River has long been famous for the quantity and size of its brook trout. Anglers have been coming to the river since the mid 1800s to fish the Nipigon waters. Although brook trout are the most famous, the river is home for many other species. Upstream of Alexander Dam the river provides riverine and lake-habitat for brook trout, lake trout, walleye, lake whitefish, northern pike and most recently smelt.

In the 1902 Annual Report of the Fisheries, the large numbers of pike, walleye and suckers in the river and their possible impact on the brook trout was noted. Early (1926) references to smallmouth bass near Alexander Dam identify them as being native to Bass Lake, a small lake that drains into the Nipigon River. Reports also indicate that sturgeon and sauger were numerous in Lake Helen in the early 1900s.

Alexander Dam blocks fish migration from Lake Superior. The lower section of river (downstream of the dam) provides varied habitat ranging from short sections of fast flowing riverine habitat to lake habitat, and is home to most of the species found in Lake Superior (Table 9). This includes exotics such as sea lamprey, alewife, brown trout, rainbow trout and Pacific salmon species.

The lower section of the river also provides some of the most important spawning habitat for the largest remnant population of the famous "coaster" brook trout of Lake Superior. Although genetic research is ongoing, it has been suggested that the "coaster" brook trout is a unique strain and can be considered an "Evolutionary Significant Unit", of the brook trout species (Behnke, 1994). Protecting the Nipigon River brook trout population and spawning habitat has been identified as a high priority in the Lake Superior Brook Trout Restoration Plan. Spawning areas for rainbow trout, salmon and walleye are also found in the lower river.

Table 9: Fish Species Present in the Lower Nipigon River

<i>Common Name</i>	<i>Scientific Name</i>
Sea lamprey	<i>Petromyzon marinus</i>
Alewife	<i>Alosa pseudoharengus</i>
Pink salmon	<i>Oncorhynchus gorbuscha</i>
Coho salmon	<i>Oncorhynchus kisutch</i>
Chinook salmon	<i>Oncorhynchus tshawytscha</i>
Rainbow trout	<i>Oncorhynchus mykiss</i>
Brown trout	<i>Salmo trutta</i>
Brook trout	<i>Salvelinus fontinalis</i>
Lake trout	<i>Salvelinus namaycush</i>
Lake whitefish	<i>Coregonus clupeaformis</i>
Lake herring/cisco	<i>Coregonus artedii</i>
Round whitefish	<i>Prosopium cylindraceum</i>
Rainbow smelt	<i>Osmerus mordax</i>
Northern pike	<i>Esox lucius</i>
Longnose sucker	<i>Catostomus catostomus</i>
White sucker	<i>Catostomus commersoni</i>
Shorthead redhorse	<i>Moxostoma macrolepidotum</i>
Lake chub	<i>Couesius plumbeus</i>
Carp	<i>Cyprinus carpio</i>
Emerald shiner	<i>Notropis atherinoides</i>
Spottail shiner	<i>Notropis hudsonius</i>
Burbot (Ling)	<i>Lota lota</i>
Brook stickleback	<i>Culaea inconstans</i>
Ninespine stickleback	<i>Pungitius pungitius</i>
Trout-perch	<i>Percopsis omiscomaycus</i>
Walleye	<i>Stizostedion vitreum vitreum</i>
Least Darter	<i>Etheostoma microperca</i>
Johnny Darter	<i>E. nigrum</i>
Logperch	<i>Percina caprodes</i>
Mottled Sculpin	<i>Cottus bairdi</i>
Slimy Sculpin	<i>C. cognatus</i>
Sauger	<i>Stizostedion canadense</i>
Yellow perch	<i>Perca flavescens</i>

Tributaries and Surrounding Lakes of the Nipigon Basin

Although some spawning occurs in Lake Nipigon, many of the tributaries continue to host spawning runs of walleye e.g. Poshkokagan, Blackwater, Namewaminikan, Wabinosh and Little Jackfish Rivers, where fish are known to travel many kilometers upstream. In the case of the Little Jackfish and Wabinosh Rivers, tagging studies have shown that, upstream, post spawning movements occur as well.

Northern pike use the wetlands along the mouths of many tributaries for spawning, particularly those along the south and west shores of Lake Nipigon. Smelt and suckers are ubiquitous in their choice of spawning streams, seeking virtually all sizes of tributaries with gravel riffle areas. Lake whitefish, while mainly a lake spawning species, are known to make a fall spawning run up at least some of the tributaries e.g. Poshkokagan and Namewaminikan Rivers. Sturgeon use the

Table 10: Fish Species Present in Surveyed Lakes South of Armstrong

<i>Protected area</i>	<i>Lake</i>	<i>Fish Species</i>
E2257r	Havoc Lake	Pike, Walleye
E2257r	Cry Lake	Lake trout
E2257r	Vooges Lake	Walleye
P2256	Wabinoash Lake	Lake trout, Pike, Walleye
C2247	Snowshoe Lake	Lake trout, Pike
C2247	Castle Lake	Lake trout, Pike
C2247	Clamp Lake	Brook trout
C2247	Walkover Lake	Lake trout, Pike
E2257r	Inspiration Lake	Lake trout, Pike
E2257r	McLaurin Lake	Lake trout, Pike
F2257r	McKenzie Lake	Lake trout, Pike

larger rivers such as Namewaminikan, Onaman, Ombabika, Little Jackfish, Gull and Poshkokagan Rivers. Brown trout and brook trout are known to inhabit the Whitesand River. Although little is known of the brown trout population, it is likely the result of an early 1900s introduction from the railroad.

The largest concentration of lakes in the planning area is northwest of Lake Nipigon and south of Armstrong. This is an area of rugged terrain and high cliffs surrounding deep lakes with cold water fisheries. Limited information is available on these lakes or their fish populations. Table 10 identifies some of the lakes and fish species present. The area north of Lake Nipigon' which includes the Whitesand River Park and Pikitigushi EMA, is characterized by gentle terrain with a small number of shallow, warm water lakes. Jojo Lake (pike) and Pikitigushi Lake (pike, walleye) are the only two lakes that have been formally surveyed.

Water

(Taken from Swainson, 2001b)

The Nipigon Watershed

The Lake Nipigon Basin is the true headwaters to the Great Lakes. Lake Nipigon has been called the sixth Great Lake and is the only Great Lake entirely within Canada. It is the 38th largest lake in the world by area and 22nd largest by estimated volume (Herdendorf, 1982). It is the 13th largest lake in North America; the 8th largest lake in Canada and the largest lake entirely in Ontario. The maximum, recorded depth is 166 metres (540 ft) (Tim Carroll, pers. comm.) and the water renewal time is 25.6 years (Paterson, et al, 1998). Including the drainage added by a 1943 diversion, the Lake Nipigon Basin drains an area of 24,650 square kilometres and is situated in the Atlantic watershed, immediately adjacent to the Arctic-Atlantic Continental Divide (Figure 10).

Approximately 1,500 rivers and streams flow into Lake Nipigon. These rivers tend to have moderate gradients and since they generally flow through areas that have little overburden, there are few meanders or other features of old age. The river channels tend to be narrow and well defined with greatest flows during April and May (Schraeder, 1983).

Figure 10 - Watershed



10 0 10 20 30 40 Kilometers

Lake Nipigon Basin Watershed

Location Map



Legend

- Dams
- Lakes
- Rivers
- Nipigon Basin Signature Site



Scale 1:318,742

Source: MNR NRVIS Data
Datum: UTM, NAD83, Zone 16
Date: May, 2001

This map is illustrative only. Do not rely on it as being a precise indicator of routes, locations of features, nor as a guide to navigation.

This map was produced by the Nipigon District Office, Ministry of Natural Resources. Additional copies can be obtained by contacting:

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The area of the Lake Nipigon watershed doubled in size from 11,050 km² to 24,650 km² with the creation of the Ogoki diversion in 1943 (Figure 10). Created to provide additional electricity at Niagara Falls in support of the war cause, water from the Arctic watershed was diverted to the Great Lakes in the Atlantic watershed, which in turn, raised Lake Nipigon water level by 35 cm.

The level of Lake Nipigon is governed by the inflow, outflow, direct precipitation and evaporation. The inflow includes inflow from the Ogoki diversion, natural inflow from groundwater, and runoff due to precipitation. Losses are due to evaporation, outflow to the Nipigon River, and through the dam regulation.

Lake Nipigon

The water quality parameters of Lake Nipigon are generally typical of large deep oligotrophic lakes on the Canadian Shield (nutrient poor, cold and well oxygenated) and have remained virtually unchanged since they were first measured in the 1920s. (Table 11). The greatest change has occurred in Ombabika Bay where turbidity from the Ogoki diversion has reduced water transparency readings from 2.3 m (1923) to 1 m (1981).

Recent food web contaminant studies have detected elevated levels of the pesticide toxaphene in Lake Nipigon fishes and suggest this is the result of atmospheric input from spraying in Mexico and South America (Whittle et al, 2000). Elevated levels of mercury have been detected since the early 1970s and persist today in some species (OMOE, 2001). The source of mercury is speculated to be from atmospheric deposition. Mercury is released into the food chain by the bacterial breakdown of organic material (e.g. bark) deposited during the log drives in the tributaries; and downstream transport of mercury released by bacterial breakdown of organic material, flooded by the creation of the Ogoki Reservoir. There are no known direct sources of toxic chemicals entering into Lake Nipigon today. Nutrient loading and water contamination may

be occurring from areas of human development. The communities of Rocky Bay and Gull Bay have water and sewage treatment facilities, however water quality has been degraded at times with boil water advisories being issued. MacDiarmid, Orient Bay and Poplar Point obtain water from wells or the lake and most have septic systems. Grey water from boats with onboard accommodations has been identified as a problem in some popular harbours in the past. Most of the larger boats are now equipped with holding facilities and a pump out facility is available at High Hill Harbour Marina.

A number of studies have been conducted on the plankton of Lake Nipigon with differing results. The initial study (MacKay, 1951) found that plankton in the lake is poor, similar to other large lakes, and dominated by diatoms. However, recent sampling (1998) by the Department of Fisheries and Oceans has found surprisingly large quantities of plankton in Lake Nipigon, relative to other large lakes. Compared with Lake Superior, ten times as much zooplankton was collected in Lake Nipigon with half as much sampling effort (M. Keir, pers. Comm.)

A benthic study conducted in 1924 (Adamstone) found that Lake Nipigon benthos are distributed in two groups, those found at depths less than 9m and those found at depths greater than 55m, with poor production in between these depths. The shallow community is made up of clams and snails (Mollusks), midges (Chironomids), mayflies (Ephemera), caddisflies (Trichoptera), scuds or sideswimmers (Amphipods) and roundworms (Nematodes). The deep water community is inhabited by sideswimmers (Amphipods), worms (Oligochaetes), midges (Chironomids), seed shrimp (Ostracods) and clams (Pelecypods).

Nipigon River

The Nipigon River has been much changed from its original state by the construction of four waterpower dams over the last 81 years. Karas (1997) aptly describes the river as it was in the past.

Table 11: Lake Basin and Limnological Characteristics for selected Lakes from the Lake Nipigon Basin

<i>Parameter</i>	<i>Lake Nipigon</i>	<i>Black Sturgeon Lake (1977)</i>	<i>Eskwanonwatin Lake (1972)</i>	<i>Jessie Lake (1974)</i>	<i>Inspiration Lake</i>
Surface Area (ha)	484,800	5,100	233	935	556
Catchment Area (ha)	2,465,000 or 2,934,800*	N/A	N/A	N/A	N/A
Maximum Depth (m)	166	52	10	42.7 m	88.5
Mean Depth (m)	estimated 46	19	5	13.4 m	11.4
Water renewal time (yrs)	25.6	N/A	N/A	N/A	N/A
Lake Perimeter (km)	1,044	76	10	34.4	35.1
Island Perimeter (km)	1,000	4	0	1.6	5.6
Oxygen (mg/l)	6.0 - 8.0 (1923) 8.6 - 13.2 (1984)	11 - 12.0	6	9.2 - 9.6	8.2 - 9.8
pH	7.5 - 8.3 (1924) 6.4 - 8.2 (1984)	7.5 - 8.5	7.4 - 7.7	8.3 - 8.8	7.0 - 7.5
Alkalinity (mg/l)	71 - 119 (1924) 30.8 - 68.4 (1984)	41	55 - 68	75	14
Transparency (m) (Secchi Disk)	4.7 - 5.2 (1924) Open Lake 4.0 - 5.5 (1984) Open Lake 7.0 (1998) Open Lake 2.3 Ombabika Bay (1924) 1.1 Ombabika Bay (1976) 1.5 Ombabika Bay (1984)	2.8	2	6.1	5.5
Total Dissolved Solids (mg/l)	114 (1922) 92 - 106 (1984)	79 - 83	111 - 118	85	23
Mean monthly epilimnetic temperature June - Aug. 1989 - 1992	13.0	N/A	N/A	N/A	N/A
Chlorophyll <i>a</i> (ug.L)	2.4	N/A	N/A	N/A	N/A
Nitrate mg/l	.016 (range .007-.075)	N/A	N/A	N/A	N/A
Total Phosphorous	.056 (range .01-.10)	N/A	N/A	N/A	N/A

"It was composed of a large river that varied in width from 50 to 200 yards, with a voluminous flow of water, 5500 cu. feet per second. In its 32-mile southerly course from Lake Nipigon, it once descended 313 feet over 15 well-aerated rapids and seven waterfalls, losing its identity only temporarily when it flowed through four lakes. It has been described as having three ecologies: 10 miles of lakes, 10 miles of river, and 10 miles of rapids."

The Nipigon River is still massive, being the largest inflow to Lake Superior; however, it is now characterized by a series of dammed lakes alternating with short turbulent stretches.

Water quality has been monitored sporadically on the Nipigon River. A water quality monitoring station at Highway 17 on the Nipigon River, was one of several that monitored nutrient loading on the north shore of Lake Superior, under an agreement with the International Joint Commission. Relative to other north shore streams, the Nipigon River was considered to be nutrient poor, had fewer solids and lower levels of conductivity, phosphorous and metals than any other tributary (OMOE 1992). Zinc and copper levels have been declining since 1983. Levels of bacteria were low, as they were for all the north shore streams. This sampling program was cancelled in 1992.

Detailed flow data for the Nipigon River has been recorded since hydroelectric development occurred on the river in 1920 and is provided in detail in Atria (1993). Flows vary from 70 m³/s to 550 m³/s with average flows of 330 m³/s. A comparison of current river flows with flows prior to dam construction indicates that the natural flows were much less variable and had only one peak flow period during the spring runoff. The current river flows show much variation and have many peak flow periods (Atria, 1993).

Benthic organisms on the lower Nipigon River were collected in 1981, 1991, 1992 and 1994 (Chessel, 1981; Atria, 1993 and B.A.R. 1995) as part of efforts to demonstrate the impacts on benthic organisms, of lampricide treatments, water level fluctuations and pipeline construction respectively. No impacts from lampricide treatments or pipeline construction were detected, however, massive impacts due to water level fluctuations were documented. These concerns have been minimized through implementation of the Water Management Plan for the Nipigon River, however, destruction of benthic invertebrates during drawdown events continues to be a concern on the river. B.A.R. (1995) reported on four separate invertebrate drift collections and stated that the high number of invertebrate taxa present (species richness) and the presence of pollution intolerant species is indicative of good water quality

Black Sturgeon River System

The Black Sturgeon River is not part of the Nipigon drainage but flows directly into Black Bay of Lake Superior (Figure 10). It is the seventh largest tributary to Lake Superior with a mean flow of 19 m³/s and a drainage area of 2,980 square kilometres (Environment Canada, 1997).

Black Sturgeon Lake is 5,105 ha. in size and has a maximum depth of 52.4 m (170 ft). A formal lake survey was first conducted in 1965 and updated in 1977. These surveys provided a depth contour map of the lake, basic water chemistry, inflow measurements, shoreline substrate mapping and fish species present. Table 11 presents a summary of Black Sturgeon Lake limnology.

Environment Canada, Water Resources Branch monitored flow data for the Black Sturgeon River from 1971 to 1997. Flows on average ranged from 40 m³/s to 9.6 m³/s, with the highest flows in May and June, and the lowest flows in February and March. In terms of nutrient loading, Black Sturgeon River is comparable to other Lake Superior tributaries but has slightly elevated levels of copper. Levels of bacteria are low.

Elevated levels of mercury have been measured in fish from the Black Sturgeon system. Significant quantities of mercury are deposited from the atmosphere to the aquatic environment from both man-made and natural sources. However, it is likely that as the large quantities of bark and debris on the river bottom, left over from the log drives, is broken down by microorganisms, methyl mercury is mobilized into the food chain. Some level of nutrient loading may occur from the year round outdoor facility on Black Sturgeon Lake. There may also be nutrient and/or bacterial loading from the heavy seasonal use of campsites at access points (none of which have septic fields).

Surrounding Lakes

Lake surveys have been conducted only on the waters listed in Table 11. An example of the limnological data available is shown for Inspiration Lake in Table 1. These lakes are typically, deep, cold, oligotrophic lakes with high oxygen, neutral pH, low alkalinity, low total dissolved solids and high transparency readings (e.g. > 4m) with slightly dark coloured water.

4. Cultural Resources

(Taken from Bluth, 2001a)

Prehistory

The Lake Nipigon Basin is important both prehistorically and historically. Although the archaeological record of human presence in the Basin is incomplete, archaeologists have divided the prehistory (period prior to written documentation) into four distinct periods: Paleo-Indian, Archaic, Initial Woodland and Terminal Woodland (MNR, 1987). All four periods are represented in the Nipigon Basin.

Paleo-Indian Period

The Paleo-Indian period (represented by the Plano culture in Northwestern Ontario) began about 9,000 years ago. Around this time, Indian people of the Plano culture are believed to have entered the Thunder Bay area from the south and west (MNR, 1982). Not a lot is known of the Paleo-Indians who moved about in small semi-nomadic groups hunting for food. It is probable that their diet included a broad range of resources including fish, wild plants, small game and large game (likely caribou). Their campsites were located on the ancient beach ridges of the glacial lakes some distance inland from the present shoreline. They used sophisticated chipped stone tools including distinctive lanceolate points for spears and large stone knives. There has been one Paleo-Indian find to date in the Black Sturgeon Lake Area (Plano point) in the Danielson collection (MNR, 1987).

Archaic Period

Around 7,000 years ago there was a transition from the Paleo-Indian culture to the Archaic Tradition. This was a result of the changing climate and distribution of plants and animals, which necessitated a shift from subsistence hunting to exploitation of a wide range of plant and animal resources (MNR, 1982). Two Archaic cultures have been recognized in Northern Ontario, Shield Archaic and Plains

Archaic. The people of the Shield Archaic culture appear to have descended from the Paleo-Indian people and were indigenous to the boreal forest north of Lake Superior (MNR, 1982). Perhaps the most important development of the Archaic culture in the Lake Superior region was the use of native copper found on the shores of Lake Superior to make tools and personal ornaments. This makes the Archaic peoples of the Lake Nipigon area some of the earliest metalworkers in the world. They manufactured their tools by heating and hammering the copper into shape. There is evidence that copper tools were being traded widely across eastern North America during this early period.

One of the first archaeological finds on Lake Nipigon was discovered in May 1955 when a grave cache of copper tools, pendants and bracelets was found. This gravesite is located two miles south of the hamlet of Orient Bay and dates to the Shield Archaic period, approximately 3,000 to 4,000 years ago. William McCollum, owner of the site, has developed a tourist resort at this location. It was Mr. McCollum's six-year-old son who, while playing in the sand by the water, discovered a copper specimen. Further digging revealed copper discs, copper bracelets, rolled tubular beads, socketed lance heads and other treasures (Griffin & Quimby, 1961).

Initial Woodland Period

The Laurel culture of the Initial Woodland period succeeded the Shield Archaic people and lasted until about 1,000 years ago (MNR, 1987). Seasonal gatherings of people for

Not a lot is known of the Paleo-Indians who moved about in small semi-nomadic groups hunting for food. It is probable that their diet included a broad range of resources including fish, wild plants, small game and large game (likely caribou).

The French, having lost a large portion of the trade, moved into the interior of Northern Ontario to establish trading posts. It was more convenient for the Natives of the northern forest to trade with the French who were close by, than to travel the Albany River to James Bay

subsistence and social purposes began to occur during this period, resulting in the appearance of larger settlements at prime fishing locations (Cooper).

These Indians developed and expanded trade routes used in Archaic times. Extensive exchange networks had been established which stretched from the eastern seaboard to the Rocky Mountains. The appearance of pottery marked the Initial Woodland period. The Laurel culture made small, conical jars with distinctive impressed decorations. The Laurel culture is also characterized by a marked emphasis on fishing, with several very large, intensively occupied, fishing village sites known (MNR, 1987). One such site is believed to have existed on Nazoteka Point on the east shore of Lake Nipigon. This site shows evidence of Initial and Terminal Woodland cultures as well as historic artifacts and appears to have been an extensive habitation site with burials present (MNR, 2000).

Terminal Woodland Period

Replacement of the Laurel pottery by the Blackduck and Selkirk pottery styles marks the beginning of the Terminal Woodland period, which lasted up until the time of European contact. Blackduck pottery is distinguished by its laminated construction, globular shape, out-flared rim and bands of decoration made by impressing a cord-wrapped stick into the clay (MNR, 1979). Selkirk pottery is distinguished by its fabric impressed surface and general decorative simplicity.

The pictographs of men, animals and symbols found on the lake are thought to be associated with the Terminal Woodland Period, with sites having been identified at Gull Bay, Undercliff and Orient Bay (Dewdney and Kidd, 1973). There is also a pictograph site near the mouth of the Nipigon River just outside the study area.

Although some archaeological research has been done in the Nipigon Basin, it is far from comprehensive or complete. Present archaeological site data for the Basin reveals

that there are approximately 3 Archaic sites, 17 Initial Woodland sites, 20 Terminal Woodland sites and 42 sites where the cultural affiliation has not yet been determined (MNR, 2000). In some cases, evidence of two or three cultural affiliations as well as historical artifacts can be found at one location.

History

Early European Contact and the Fur Trade

In pre-contact times, North American Natives had well-established trade routes. These routes were used for thousands of years to transport trade materials for hundreds even thousands of miles (Old Fort William Report, 2000). These routes and the intimate knowledge the Natives had of the landscape, were the foundations upon which the historic fur trade was built.

The first historical record of Lake Nipigon came in 1656 when the Governor of New France granted to Sieur Zachaire Dupuy, a colonial officer, an exclusive trading concession from the Gulf of St. Lawrence to "Lac des Alepinigons" (Kelso & Demers, 1993).

The first well documented excursion to Lake Nipigon dates back to 1667 when Father Claude Allouez, a Jesuit Missionary, came in search of his band of Nipissing Indians who had fled Southern Ontario in the wake of the Iroquois wars of 1650. Allouez wrote of his trip up the Nipigon River

"...we left it (Lake Superior) on the 25th of this month of May and consigned ourselves to a river so full of rapids and falls that even our savages could go no farther; and learning that Lake "Alimibegong" was still frozen over they gladly took the 2 days rest imposed upon by necessity"
(Allouez, 1667) in Kelso & Demers, 1993

In 1659, two French fur-traders – Pierre Radisson and his brother-in-law Médard des Groseilliers defied orders from the Governor of

New France and set out to explore beyond the trading territories known to Europeans at that time. They traveled up the Ottawa River, through Lake Nipissing and up the Great Lakes to the north shore of Lake Superior. There is some uncertainty in the literature as to whether the men traveled north to James Bay via Lake Nipigon at this time. However, they did discover from the Natives, that the majority of furs traded actually came from the northern forest and they realized that Hudson's Bay gave the easiest access to this fur rich area (CBC Web Page, 2001).

Finding little support from their native France, the two men obtained the support of King Charles II of England. Further successful voyages by these two men led to the creation of the Hudson Bay Company in 1670. Company forts were established along the Hudson Bay coast and the company conducted trade by having the Natives come to them (CBC Web Page, 2001). In order to reach the Albany River - James Bay route, the Indian traders traveled from Lake Nipigon up the Wabinoosh, Pikitigushi, Jackfish, Ombabika, Onaman, and Namewaminikan River systems.

The French, having lost a large portion of the trade, moved into the interior of Northern Ontario to establish trading posts. It was more convenient for the Natives of the northern forest to trade with the French who were close by, than to travel the Albany River to James Bay. Consequently, trade with the Hudson's Bay Company declined dramatically. Thus ensued a long battle between the English and the French for the fur trade. The Nipigon Basin was very much at the centre of this conflict and was the site of many fur trading posts (Table 12 & Figure 11).

The Montreal traders banded together in 1779 to reduce expenses and eliminate the rivalry between individual traders. This group of traders became known as the North West Company and grew into the Hudson Bay Company's fiercest competitor (MNR, 1987).

Duncan Cameron, a partner in the North West Company, was made proprietor of the Nipigon Department in 1786. That same year the North West Company built its first post in the Nipigon area at the mouth of the Nipigon River called Nipigon River House. In 1795, Fort Duncan was built at Wabinoosh or Windigo Bay (Bird & Hale, 1994). By 1800, the North West Company dominated the fur trade in northern Ontario.

The competition between the two companies resulted in the over-exploitation of the animal resources in the area. It also resulted in increased business expenses as each company struggled to outdo the other by building more posts and offering more trade goods to the Natives. Both companies increasingly saw the futility in their competition and after numerous attempts, the two companies merged under the name "Hudson Bay Company" on March 26, 1821 (City of Edmonton Web Page, 2001).

The Early Gentlemen Anglers

Gentlemen anglers were found on the Nipigon River as early as 1865. Between 1870 and 1880, Red Rock House, located at the mouth of the Nipigon River was at the height of its growth and was an important outfitting station. Newton Flanagan, Chief Trader at Red Rock House, recorded for 1887 that "one hundred and two persons made application for and received permits to fish" (Kelso & Demers, 1993).

Anglers reached Nipigon mainly through the Campbell line of steamers that stopped regularly in Nipigon. The tourists disembarked in Nipigon and for a small fee were able to hire an Indian guide and a canoe and travel up the Nipigon River to fish for the famous brook trout (Kelso & Demers, 1993). Those who fished the Nipigon met with splendid success. Word of the excellent fishery got around and in 1887, Forest and Stream magazine named the Nipigon River the finest trout stream in the world (Kelso & Demers, 1993).

**Lake Nipigon Basin
Historical Trading Posts**

Location Map

Legend

- Primary Railways
- Secondary Railways
- Trading Posts
- First Nation Reserve
- Rivers
- Lakes
- Nipigon Basin Signature Site

Scale 1:315,957

Source: MNR NRVIS Data
Datum: UTM, NAD83, Zone 16
Date: May, 2001

This map is illustrative only. Do not rely on it as being a precise indicator of routes, locations of features, nor as a guide to navigation.

This map was produced by the Nipigon District Office, Ministry of Natural Resources. Additional copies can be obtained by contacting:

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10 0 10 20 30 40 Kilometers

Table 12: Fur Trading Posts in the Lake Nipigon Basin

<i>Post</i>	<i>Company</i>	<i>Believed Location</i>	<i>Estimated Date of Existence</i>
Fort Nipigon	HBC	Mouth of Ombabika R.	1792-1821
Fort Otoulibis	French	Mouth of Pikitigushi R.	1684
Jackfish Post	Revillion Freres	Mouth of Jackfish R.	1905-1916
Shaws Post	Independent	Mouth of Ombabika R.	1788
Fort La Maune	French	Mouth of Ombabika R.	1684-1750
Poplar Lodge Post	HBC	Mouth of Namewaminikan R.	1825-1880
Sand Point	HBC	Mouth of Pijitawabik Bay	1890-1924
Bay View	HBC	Orient Bay	1890
Southeast Shore Post	NWC	McIntyre Bay	1800
Grand Bay	HBC	Grand or McIntyre Bay	1890-1924
Champlain Point Post	French	West Shore L. Nipigon	Prior to 1784
Nipigon House	HBC	Gull Bay	1937
Nipigon (Wabinosh) House	HBC	Opposite Jackfish Island	1850-1937
Wabinosh River	HBC	Wabinosh R. Mouth	1895
Fort Duncan	NWC	Wabinosh or Windigo Bay	1795-1821
Wabinosh House	HBC	Wabinosh Bay	1821-1850
Windigo Bay	HBC	Mt. St. John	1884
Mud River	HBC	Pikitigushi R. Mouth	1890
Rocky Island	French	Rocky Island Lake	Prior to 1784
Fort Ste. Anne	French	South Shore Lake Helen	1717-1775
Nipigon River House	NWC	Mouth of Nipigon R.	1785-1821
Red Rock House	HBC	Mouth of Nipigon R.	1859-1900
Clark's Post	Independent	Mouth of Nipigon R.	1860
Nipigon Post	Revillion Freres	Mouth of Nipigon R.	1905-1916
McKurdy's	Independent	Nipigon R.	1888
Nipigon Store	HBC	Nipigon R.	1895

Source: Dawson, 1969

HBC = *Hudson Bay Company*

NWC = *North West Company*

In 1888, changes in the abundance of fish were noted. A.R. MacDonald, an American outdoors man, wrote

"Unless it is cherished, the glory of the Nipigon may fade and the story of its marvelous attraction may become a tradition of the past."

The tourists kept coming in increasing numbers and the costs for outfitting and guides increased. In 1901, landings, improved portages and trails to fishing pools were constructed between Lake Nipigon and Camp Alexander on the Nipigon River. In the early 1900s the Fisheries Branch received reports that the average size of fish had declined and that fish were not as numerous.

There were many boats that sailed Nipigon's waters during the construction of the railway and for commercial fishing. Some of the names include: the "Pewabic", the "Fluber", the "Viking" and the "Flying Pig."

In 1916 a world record was set when a brook trout was caught at Rabbit Rapids on the Nipigon River. Dr. J.W. Cook of Fort William, Ontario, caught a 6.58 kg (14.5 lbs.) brook trout with a live minnow (McKirdy). This record has yet to be broken and of course served to enhance the legendary appeal of the "Nepigon."

In 1919, Edward, Prince of Wales and heir to the British Throne, who became King Edward the VIII, made his first visit to Canada. Part of this royal tour included a three-day fishing and camping trip on the Nipigon River. The trip was a great success and the Prince was reported to have had an excellent time (Whalen, 1998).

The Railway

In the spring of 1871, Sanford Fleming, Chief Engineer of government surveys for the proposed Pacific Railway, sent a party of surveyors to the Nipigon region. Their mission was to locate a practical route for a railway running east to west from a point about 32 kilometres north of Lake Nipigon. At the time, running a rail line along the rocky, northern shores of Lake Superior was not considered feasible. The party traveled by boat to the north end of the lake and began the task of surveying. However, due to a lack of necessary supplies, the survey crew was forced to abandon their project.

The Canadian Pacific Railway was built through the Nipigon region from 1883-1885 (Kelso & Demers, 1993). Nipigon town site, river and lake were important links in the supply route to the railway location. This section of the Canadian Pacific was among the most difficult and expensive to complete due to the rocky and rugged topography.

Not long after this, in 1901, Sir Wilfred Laurier determined that a second transcontinental line was needed to deal with the increasing occupation and economic activity in western Canada. This line was to run north of the Canadian Pacific from Quebec to Vancouver. Laurier saw this as a way to open up vast areas of the country to settlement (Todd, 1977). Government survey crews for the National transcontinental project passed through Nipigon in the fall of 1903. They headed north up Lake Nipigon to run trial locations for the line just as Fleming's surveyors had done over 30 years previous. The route finally selected was similar to that recommended by Sanford Fleming (Todd, 1977).

Transporting equipment and supplies into this remote northern area proved to be a difficult task. Horses and dog teams were used to haul supplies to the various construction sites. In the summer, the Nipigon water route was used. The problem of portaging supplies around the many rapids on the Nipigon River was resolved by building an eighteen mile long tramway along the river called the Nipigon Tramway (Todd, 1977).

No sooner had construction on the National Transcontinental begun than William MacKenzie and Donald Mann, owners of the Canadian Northern Railway, announced their intent to build a Pacific and eastern extension to their railway, creating a third Trans-Canada railway. This line headed up along the shore of Pijitawabik Bay and East toward Longlac. The construction of this transcontinental railway was completed in 1914 (Todd, 1977).

New Resource Industries in the Basin

With a food shortage brought on by World War I and the completion of the railroad, allowing easy transportation to markets, the lake was opened up to commercial fishing in 1917. Ice houses were established at McDiarmid where Federal Department employees acted as fish buying agents from 1917 until 1958. Fish were unloaded at MacDiarmid and transported by horse-drawn

wooden sled over cleared ground to the C.N.R. rail line for shipment. Commercial fisherman, Adolph King (1971), described the lake as producing an

"unbelievable tonnage" and "fishing outfits swarmed into MacDiarmid from all directions in the spring of 1917 to get their share of what was regarded then as a 'Bonanza' or a 'Klondike'. Day after day the tugs and gas boats ... came in loaded with fish. This condition ran from 1917 through 1918 and 1919."

There were many boats that sailed Nipigon's waters during the construction of the railway and for commercial fishing. Some of the names include: the "Pewabic", "the "Fisher", the "Viking" and the "Flying Pig." The largest vessel on Lake Nipigon was the "Ombabika". It was shipped in sections and put together on Lake Nipigon. It measured 82 feet in length and was designed for passengers and freight. It was used initially in building the railway and later as a commercial fishing vessel. Its service ended in 1931. The "Ombabika's" boiler can be seen under about 3 feet of water approximately 1 mile south of MacDiarmid (King, 1971).

Hydro development was the next natural resource industry to come to the Lake Nipigon Basin. Construction of the Cameron Falls hydro dam began in 1918. In 1926 came the construction of the Virgin Falls storage dam, then the Alexander Dam in 1930 and finally the Pine Portage Dam in 1950 (Kelso & Demers, 1993). In 1940, construction of the Ogoki Diversion began. The intent was to take the waters of the Ogoki River that naturally flowed north into the Albany River and then to James Bay, and force them south into Lake Nipigon.

The forest industry was also evolving in the Basin. Early logging in the Lake Nipigon Basin was primarily for ties and trestle timbers used in building the Canadian Pacific Railway in 1883-85. Timber needs for the Canadian Pacific and Canadian northern railways were also supplied by cutting in the Nipigon area until 1915. After that, pulpwood logging increased with the development of paper mills in Port Arthur, Sault Ste. Marie, and, more locally, in Nipigon and Red Rock.

Historical harvesting operations were considerably more labor-intensive than the present day mechanized logging. All timber was cut by bucksaw and piled by hand. During the winter the wood was loaded onto sleighs and pulled by horses to landings located either on the ice of the lake or along the bank of the river to await spring thaw. Log drives functioned as the major means of transporting the wood. The main rivers used to transport logs from these inland cutting sites to Lake Nipigon were the Ombabika River (1939-1963), Namewaminikan River (1944-1972), and the Onaman River (1939-1972). However, nearly all rivers that are tributaries to Lake Nipigon were used for this purpose at one time or another.

During the log drive, Chief Bay, Humbolt Bay, Gull Bay, McIntyre Bay, and Poplar Point were all used for the booming of logs. The logs were towed down Lake Nipigon and floated down the Nipigon River. Booms were reformed in Lake Helen, and towed to Red Rock or Thunder Bay for processing. It took approximately one year from the time timber was cut to the time it was finally processed in the mills in Thunder Bay.

The first attempt to drive logs down any part of the Nipigon River was made in 1900 by James Whalen. Since there was no dam construction at that time, the river was very rough and proved to be a challenge with log jams occurring on sections between Alexander Falls and Jessie Lake. Whalen established camps along the Nipigon River and continued to drive logs until 1907 (Kelso & Demers, 1993).

Full log drives started again on the Nipigon River in 1923 and continued until 1973. The logs were cut on the shores of Lake Nipigon and along rivers running into the lake. Most of the cutting was done in winter months. Logs were piled on skids near shore on the ice. When the ice went out, the logs were towed in rafts of up to 7,000 cords to Virgin Falls for the drive down the river. Abitibi Power and Paper Company did the towing on Lake Nipigon to the river for all the timber companies. Abitibi also held the rights to the river drive. The tugs brought rafts of wood from Humbolt and Ombabika Bays. Wood was also stored over winter near the mouth of Onaman River and Stewart Creek (Kelso & Demers, 1993). Remnants of old logging camps can still be found in a number of locations around the Lake Nipigon Basin

Mining

In 1929, T.G. Powers and P. Silam discovered gold east of Beardmore. The property became the "Beardmore" and later the "Northern Empire" Mine. The mine produced continuously from 1934 to 1941. Production totaled 149,493 ounces of gold and 19,803 ounces of silver.

The Leitch and Sand River mines were the other two producers in the Beardmore Camp. Over one million ounces of gold were produced within an 8 km radius of Beardmore, Ontario. Russell Cryderman discovered the Sand River Gold Mine in Eva Township in 1934. From 1937 to 1942, 50,065 ounces of gold and 3,128 ounces of silver were recovered. Russell and James Cryderman discovered the Leitch Gold Mine in 1935. From an initial surface showing, the Leitch Mine became one of the richest gold mines in Ontario. From 1936 until the closure of the mine in 1968, total gold production was 847,690 ounces.

5. Recreational Resources

Recreational Features

(Taken from Kuntz, 2001)

Recreational features are biophysical or cultural attributes that may be able to support recreational activity. There are eight recreational features that have been identified for the Nipigon Basin: sport fish, animals of special interest, very large waterbodies, numerous islands, water routes, stacks and cliffs, snow routes and protected moorage.

Sport Fish

The Lake Nipigon watershed, most notably the Nipigon River, has been famous for its brook (speckled) trout since the mid 1800s. The present sport fishery in the Lake Nipigon area is based on brook (speckled) trout, walleye (yellow pickerel), lake trout and northern pike. The brook trout and walleye populations are in a degraded state and a recovery plan initiated special restrictions for all sport species. Lake Nipigon, because of its remoteness and size, provides a challenge for the sportsman. In general, the character of the lake restricts most sport fishing to the near-shore areas and those locations near road access.

The Nipigon River is easily accessed and provides opportunities for brook trout, lake trout, lake whitefish, salmon and rainbow trout angling. The brook trout have suffered over the years from over fishing and habitat degradation. New regulations and a Water Resources Strategy and Operational Plan have been implemented to help restore the fishery.

The Black Sturgeon River system is also easily accessed and offers sport fishing for walleye, northern pike, smallmouth bass and a few brook trout. The lower reaches of the river offer rainbow trout and salmon in addition to the above species.

Animals of Special Interest

Moose (*Alces alces*) are relatively abundant in the Lake Nipigon Basin. The availability of moose provides excellent wildlife viewing opportunities in a pristine setting as well as Aboriginal subsistence, commercial tourism and local hunting opportunities.

The elusive and threatened caribou is certainly an important ecological aspect of the Basin and represents another recreational feature. The possibility of seeing a woodland caribou in the wild adds to the quality of the wilderness experience. Along Lake Superior, sea kayaking clientele are attracted by the chance of seeing a caribou (Experience North, 2001; Naturally Superior Adventures, 2001). The same group of people would most likely be interested in this type of experience on Lake Nipigon.

Deer are present, albeit scarce, in the Lake Nipigon Basin (North-South Environmental, 2001). Most of the populations are found to the south of the lake, in the Cameron Falls area. If the deer population continues to increase due to disturbance caused by logging, new wildlife viewing and recreational hunting opportunities would be created.

Black Bear and timber wolves are two other large mammals present in the Basin. The chance of spotting a bear fishing off the shores of Wabinoosh Bay or hearing a wolf howling in the night or discovering large tracks on a remote sandy beach, enhances the wilderness character of the area.

The relative abundance of the endangered bald eagle and white pelican on Lake Nipigon allows for the unique opportunity to observe these magnificent birds in their natural habitat.



*The Nipigon River
is easily accessed
and provides
opportunities for
brook trout, lake
trout, lake
whitefish, salmon
and rainbow trout
angling.*

The lake's large size, high winds and huge waves place limitations on the kind of boats that can safely travel its waters. However, for a properly equipped visitor, Lake Nipigon offers endless scenic beauty and wilderness for boating, nature and outdoor enthusiasts.

Large Waterbodies

With a surface area of more than 484,800 hectares, a diverse shoreline featuring bays, peninsulas, cliffs, rocky and sandy beaches and the presence of numerous islands, some over 1,400 hectares in size, Lake Nipigon is truly a spectacular piece of landscape. The ecological and recreational attractiveness of the lake and its surrounding lands stems from the fact that the area remains relatively remote, there are a limited number of access points, and the vast majority of its ecosystems are in a natural condition (North-South Environmental, 2001).

The lake's large size, high winds and huge waves place limitations on the kind of boats that can safely travel its waters. However, for a properly equipped visitor, Lake Nipigon offers endless scenic beauty and wilderness for boating, nature and outdoor enthusiasts. There is no depth map available for Lake Nipigon. Sounding maps, if produced and made available, could be used to market the area to sea kayakers and other interested boaters. Kayakers and sailors use this information when route planning.

Islands

The hundreds of islands on Lake Nipigon add diversity to the landscape, act as wind breaks and provide sheltered bays for camping and mooring. The islands are also an essential component of the woodland caribou's habitat. Caribou move onto the islands in the spring to calve where they are protected from wolf and bear predation. American white pelican require remote islands as well.

Water Routes

There are several canoe routes that begin inland and terminate at Lake Nipigon, including the Namewaminikan (Sturgeon), Blackwater, Black Sturgeon, Whitesand, Pikitigushi, Little Jackfish, Gull (Kiashke), Kopka and Kabitotikwia Rivers. Both the Nipigon River and Black Sturgeon River are easily accessible and offer canoeing opportunities (Figure 3).

The west side of Lake Nipigon (C2247 and E2257r) boasts numerous interconnecting lakes and scenic landscapes which provide opportunities for excellent back-country canoeing. Further public consultation will determine if and to what degree this area is already being used or could be developed.

There are a number of rapids on the rivers within the Basin. Fast water and rapids exist on the Little Jackfish, Nipigon, Black Sturgeon, Namewaminikan, Gull and Kopka Rivers. These rivers may provide opportunities for whitewater canoeing, kayaking or rafting. These experiences would be consistent with the policy intent of waterway class parks and protected areas.

Stacks and Cliffs

Extensive, flat-lying Logan and Nipigon diabase sills dominate the bedrock within the majority of the Lake Nipigon Basin. These sills form thick, nearly horizontal strata up to 200 m thick which have been emplaced within sedimentary rocks (OMNR, 1987). Over time, the softer sedimentary strata have been eroded away, leaving spectacular displays of cliffs and outcrops, particularly in the Palisades area of Pijitawabik Bay and Tchiatang Bluff in Black Sturgeon Bay.

These cliffs provide recreational opportunities for rock and ice climbers. The twenty-kilometre valley to the south of Orient Bay has particularly steep and rocky walls and several small lakes on the plateau above. This extreme relief, and constant supply of water on the plateau, offers the summer tourist picturesque waterfalls on the spectacular cliffs. With cooler temperatures and snow accumulation, the flow of water slows, ice begins to form and the waterfalls freeze, creating perfect conditions for ice climbing.

Snow Routes

The climate of the Nipigon Basin, with its long winters and considerable snowfall, lends itself to winter trail activities such as snowmobiling, snowshoeing, cross-country skiing and dog sledding. There are numerous logging roads, old trails, snowmobile trails, hydro and pipeline corridors within the Basin, which provide the opportunity for these activities. Frozen waterways throughout the Basin can also be used as travel corridors for snow route activities. The strong winds, chilling temperatures, varying ice conditions and shear size of Lake Nipigon make snow activities on the lake more of a challenge.

Protected Moorage

There are 82 known safe harbours on Lake Nipigon (A. Nyman, pers. comm., 2001). Not all harbours can provide protection for all boats in all wind conditions. The majority of these natural harbours and anchorages are undeveloped, but provide safe moorage when on the lake. The draft and length of a boat will determine the number of places that can provide protected moorage.

Other Features

There are two other recreational features worth noting in the Basin. Beautiful natural beaches exist throughout the Basin, providing excellent opportunities for shore lunches, swimming and remote camping. Also, the rich and diverse history of human activity in the Basin is certainly a feature with recreational potential. The existence, past and present, of Aboriginal settlements, fur trading posts and logging camps on the shores of Lake Nipigon provide opportunities for cultural learning that would attract tourists to the area.

6. Natural Resource Use

Wildlife Resource Use

(Taken from Swainson & McNaughton, 2001)

In 1957, the Lake Nipigon Islands Crown Game Preserve was established (Gollat, 1975). The Islands retained their game preserve status until 1965, at which time the Lake Nipigon Islands Crown Game Preserve was abolished. A remnant of the Lake Nipigon Islands Crown Game Preserve was reclassified under Regulation 22 and designated the Geikie Island Caribou Crown Game Preserve (Gollat, 1975). The intent of this preserve was to act as a refuge for the remnant woodland caribou herd thought to exist on the islands.

Moose are the principal big game animal in the Nipigon and Thunder Bay Districts. As noted above, the Lake Nipigon Islands Crown Game Preserve protected the moose population from hunting from 1957 to 1965. In 1965 the islands were opened to hunting and the moose population was decimated. The islands have been closed to hunting since 1970. Moose continue to be heavily targeted during hunting seasons in the rest of the Basin and Nipigon District as a whole. Aboriginal and treaty rights of First nation peoples allow for the right to hunt for subsistence purposes. The extent to which subsistence hunting occurs within the Basin is unknown (H. Paulsen, pers. comm.).

The Lake Nipigon Islands make up Wildlife Management Unit 20 (WMU 20). There are six other Wildlife Management Units that surround Lake Nipigon as follows: 16C, 18A, 15B, 13, 21A, and 19 (Figure 12). Moose tags are allocated on a per unit basis; therefore, it is difficult to determine current hunting pressure given the overlap of the six Wildlife Management Units with the Nipigon Basin study area.

A total of 110 moose were estimated from the 2001 moose survey of WMU 20. Although this reflects a 30% increase over the 1998 survey and the highest estimate in thirty years, the herd is still less than half of what it was in the early 1960s when it was estimated to be 276 moose (Gollat, 1975).

Change in habitat caused by disturbance (fire and budworm) combined with three relatively mild winters (1998, 1999 and 2000) are likely factors in explaining the increase in numbers from the previous survey. The low number of calves can possibly be attributed to predation by wolves, which were sighted on Shakespeare Island in both the 1998 and 2001 inventories.

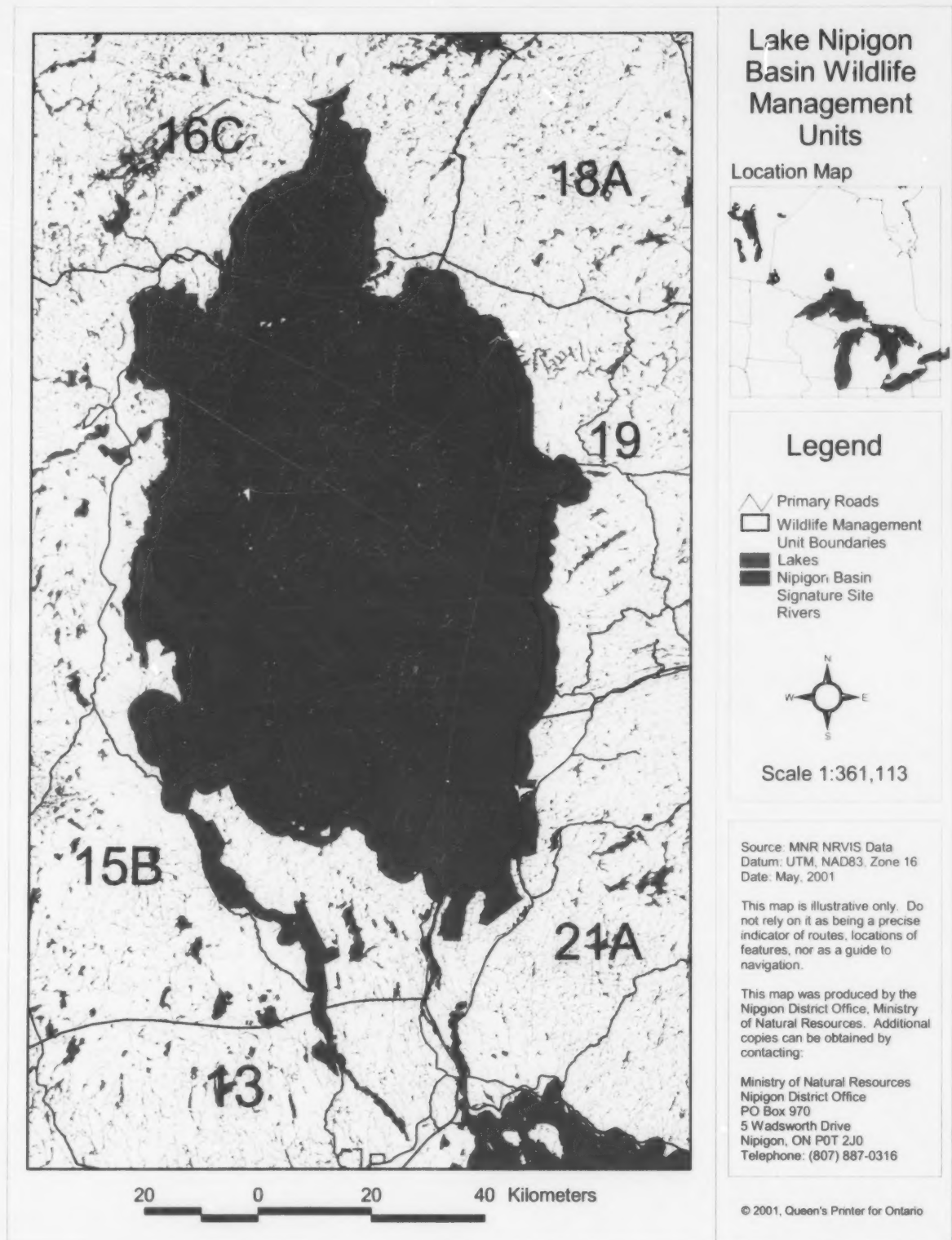
Number of moose is quite small therefore, fluctuation in numbers is noticeable and may be influenced by environmental factors, predation by wolves or significant changes to habitat. There is no big game hunting season in WMU 20 however, there are two First Nations communities (one on either side of the lake) that harvest some animals. Hunting of small game for grouse and snowshoe hare is allowed.

Moose on the mainland continue to be heavily targeted during hunting season. Forest disturbance from timber operations, which can be beneficial habitat for moose (early succession forest) has its drawbacks. In open cutovers, hunters more easily spot moose, and logging roads provide greater accessibility. Hunting pressure along Black Sturgeon waterway and the south shore of Lake Nipigon is particularly high and has been for the past fifty years.



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factors, predation
by wolves or
significant changes
to habitat.*

Figure 12 - Wildlife Management Unit



The black bear has steadily increased in importance as a big game animal. In the Nipigon District it is second only to moose. Bear hunting is done primarily by non-residents using local bear outfitter services. Recently, the increasing demand for bear gall bladders, bear paws, and other parts that are believed to have medicinal and aphrodisiacal value has caused concern about increased illegal killing of bears. Other species hunted in the study area include upland game birds, waterfowl and white-tailed deer.

The fur trade was the first industry to make commercial use of the Lake Nipigon region and has therefore played a major role in the exploration and development of the area. The Ontario Department of Lands and Forests implemented a licensed trapping system in 1947. Trapping was not permitted on the islands during 1957-1965 as per the Lake Nipigon Islands Crown Game Preserve. In the late 1960s and early 1970s, beaver was the major species taken on the islands of Lake Nipigon. Others included muskrat, otter, mink, red squirrel, pine marten, lynx, fisher, wolf, red fox and weasel. As of the 1998, trapping season, the predominant species trapped were marten, beaver, and weasel. There are 41 traplines that are either completely within or intersect at least one of the newly proposed protected areas (provincial park, conservation reserve, or enhanced management area) within the Lake Nipigon Basin Signature Site (Figure 13). Within existing provincial parks, traplines will be phased out at the earliest opportunity and no later than January 1, 2010.

Fisheries Resource Use *(Taken from Swainson, 2001a)*

Lake Nipigon

Commercial Fishing

Lake Nipigon fisheries have a long history of subsistence use by First Nations dating back as early as 8700 B.C. (Dawson, 1976). It was not until the early 1900s that the fishery was opened up to mechanized commercial fishing. The previously untouched stocks were quickly over-fished with a peak harvest of 2.3 million pounds in 1919 (Figure 14).

The commercial harvest from 1917-2000 has been characterized by widely fluctuating annual differences likely the combined result of fluctuating stock abundance (strong year classes) and variable fishing effort (driven by market prices, weather and number of fishermen).

As it was in 1917, lake whitefish has continued to be the mainstay of the Lake Nipigon commercial fishery. Other species such as walleye, lake trout, sauger, and to a lesser degree, northern pike have varied in their contributions to the fishery. The sturgeon fishery has remained at a very low level since its collapse from over fishing in the 1920s. Although it has not been studied in detail it is believed that the sturgeon population has never recovered. The most significant change in recent years has been the explosion of the commercial fishery for smelt. First seen in the lake in 1976, the commercial smelt fishery has grown from a couple of thousand pounds annually in the early 1990s to over half a million pounds by 2000.

Reported commercial harvests from 1990-1998 for lake whitefish and lake trout have been stable, whereas walleye and sauger harvests have remained at low levels following a decline in harvest and subsequent closure of Ombabika Bay to commercial fishing in 1996. Commercial harvest of northern pike and ciscoes also declined during the 1990s but these fish are seldom targeted and are usually considered as incidental catch.

Figure 13 - Traplines

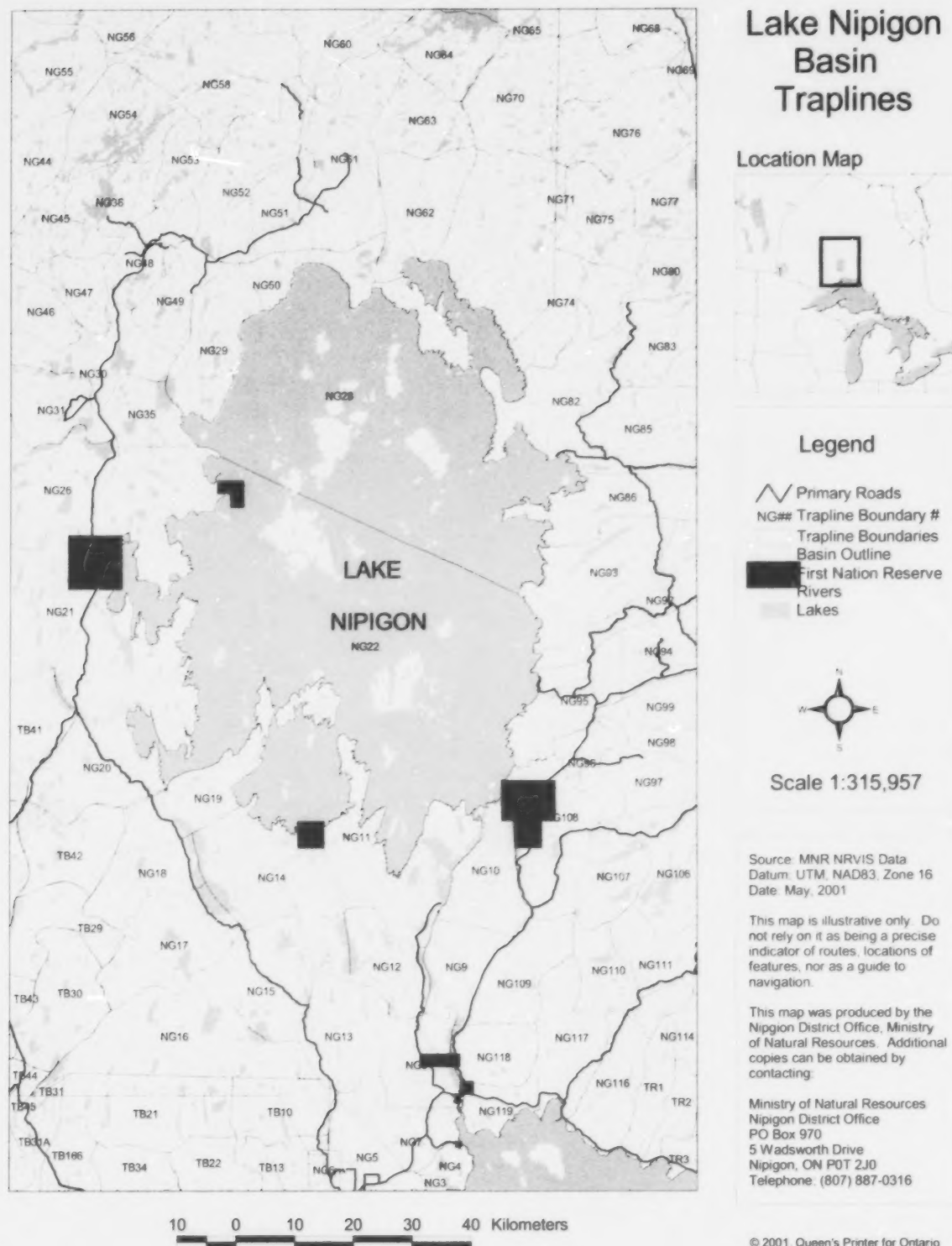
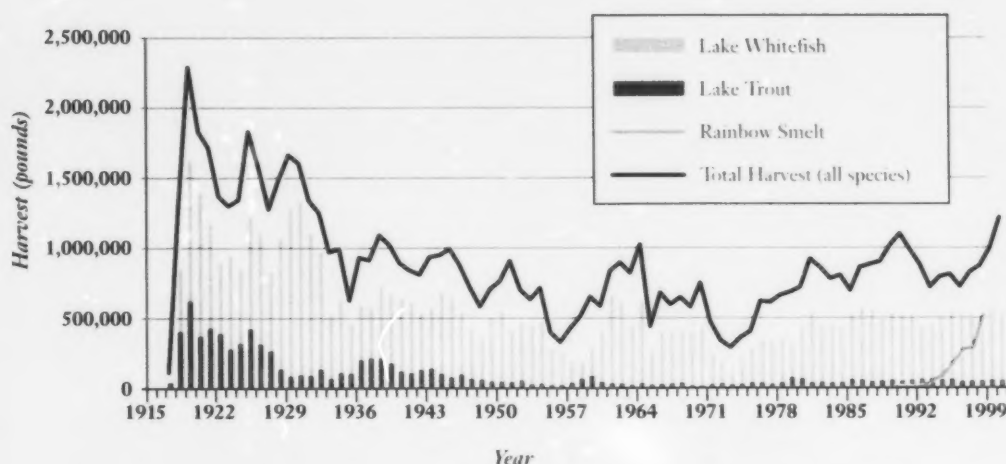


Figure 14: Reported Commercial Harvest, Lake Nipigon (1917 – 2000)



There are currently ten commercial fishing licenses on Lake Nipigon, all issued to First Nation or Métis people. Lake wide quotas are assigned to each license for each fish species, and fishermen are restricted to the size and type of gear that can be used. Special conditions address fishing seasons, minimum sizes and protection of sturgeon. Recently, a criteria has been developed for evaluating the stock status of lake whitefish based on biological indicators and a protocol for adjusting quotas has been recently implemented. Similarly, stock status criteria for evaluating lake trout stock status and a quota adjustment protocol is currently being developed for lake trout

While commercial fishing is permitted throughout most of the lake, fishing is prohibited in specific areas or at certain times because of the occurrence of spawning habitat, degraded stocks, and user group conflicts. Restricted areas include: West Bay, Chief Bay, Black Sturgeon Bay, the southern portion of South Bay, the Sand River area, the area within two miles of Virgin Falls, and Pijitawabik Bay. No commercial fishing is allowed within 1 km of any river mouth. Ombabika Bay and Wabinosh Bay are closed to commercial fishing to allow for the rehabilitation of the degraded

walleye stocks. First Nation's people have exclusive commercial fishing privileges in Gull Bay and the southern portion of McIntyre Bay. A lake wide fall closure (October 15-November 15) is in place to protect spawning lake trout and lake whitefish.

In 1979, the Lake Nipigon Fisheries Assessment Unit (LNFAU) was formed. The unit continues today to monitor trends in the fishery by collecting and analyzing fisheries data. These data are reported to the Nipigon District fisheries managers who are responsible for taking appropriate management actions based on the data, e.g. quota or season adjustments.

Sport Fishing

While the commercial fishery "exploded" on Lake Nipigon from 1917 to 1930, the sport fishery did not, largely because of the challenges of fishing a lake this size. Beginning with some guided "outfitter" trips, the earliest sport fishing on the lake seems to have occurred in the early 1920s, as spill over from the crowded Nipigon River. The fishing was focused on the famous brook trout and occurred mostly around the islands at the entrance to the Nipigon River.

*There are currently
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After World War II, Lake Nipigon became known for its northern pike and walleye fishing which attracted many American anglers. Access had been created into the South Bay area, which was sheltered and more hospitable to the self-guided small boat angler. Tourist outfitters, using converted fish tugs, based mainly in Orient Bay, were offering guided, multi-day, live-on boat trips, around the lake.

In 1951, there were 12 tourist outfitters operating 16 charter boats with angling pressure focusing on brook trout, northern pike and walleye (Ritchie and Black, 1988). By 1975, there were seven tourist outfitters operating charter boats and some anglers were traveling out on the lake on their own, pitching tents to use as base camps on the islands (Gollat, 1975). Savioja (1986) estimated that in the early 1980s, approximately 75% of the sport fish effort on Lake Nipigon was by tourist outfitters with effort aimed at brook trout (42%), walleye (43%) and northern pike. Lake trout represented 2% of the effort and 4% of the harvest.

The 1990s brought huge changes to the sport fishery. The widespread use of technology such as depth finders and down riggers by the average angler, resulted in the "discovery" of the recovering lake trout stocks. This led to an "explosion" of this fishery, targeting large, 9-13 kg lake trout. Effort directed at lake trout through access points at Poplar Point and High Hill Harbour, tripled in three years. Not surprisingly, fishing quality has dropped dramatically from 1 lake trout per 3 hours of fishing in 1993 (van Ogtrop, 2001) to roughly 1 trout for every 7 to 8 hours of fishing by 2000 (LNFAU, unpublished). The most recent lake wide creel survey showed 50% of the total sport fish effort was aimed at lake trout, followed by walleye (30%), northern pike (11%) and brook trout (6%) (van Ogtrop, 2001).

There has been much concern about the declining quality of the lake trout fishery and the high level of angling pressure, as well as the degraded state of the walleye fishery and the lack of big northern pike. There is guarded

optimism that the brook trout fishery is showing signs of a slow recovery. In an attempt to sustain a high quality sport fishery in the face of increasing angling pressure and to assist with the recovery of degraded sport fish populations, a set of special fishing regulations for Lake Nipigon was implemented in 1997 (Table 13).

Nipigon River

The Nipigon River has been popular among sport fishermen since the mid 1800s. The numerous, large brook trout have held legendary appeal for over a century. In the early 1900s, government-hired overseers were reporting a decline in brook trout numbers in their annual reports.

Damming of the Nipigon started in the 1920s with the Cameron Falls Dam, and then in subsequent years, the Virgin Falls Dam, Alexander Dam and Pine Portage Dam. Damming raised water levels and flooded out 20 km of whitewater rapids and prime brook trout waters. Log drives began in 1923 and continued until 1973 causing immeasurable damage to fish habitat in the river. From the 1940s to the 1960s, streams and rivers within a eight kilometre radius of Cameron Falls were poisoned with DDT in an effort to control blackflies. This also had detrimental effects on the aquatic life and fishery of the Nipigon River as well.

With the operation of the dams for electric power generation, water level fluctuations on the river were severe at times. This destroyed brook trout spawning habitat. From the 1960s to the 1980s, brook trout on the river became increasingly rare. However, with the implementation of a brook trout rehabilitation plan, developed in 1989, a water management plan and more anglers practicing live release because of size limits and changing ethics, the river fishery appears to be improving slightly. Angling pressure is still high in the river however, with preliminary results of angler tagging studies showing brook trout recapture rates as high as 50%, meaning one out of every two fish is caught (Swainson, unpubl.)

Over the years to present day, various fisheries management programs and activities have been implemented. These include special limits and seasons to protect brook trout, stocking programs, sea lamprey control, angler surveys, brook trout tagging and tracking, habitat improvement and water level management

Today there is high angling pressure on the brook trout at Virgin Falls and a limited fishery for large northern pike in Forgan Lake. From Pine Portage to Cameron Falls, including Jessie Lake, there is a significant brook trout, lake trout and lake whitefish fishery, as well as a

large spring dip net fishery for smelts. Between Cameron Falls and Alexander Dam there is a limited brook trout, walleye and northern pike fishery. From Alexander Dam downstream, there is a significant lake trout, rainbow trout, brook trout and chinook salmon fishery.

Black Sturgeon River System

A commercial fish license for Black Sturgeon Lake was fished sporadically from 1965 to 1978 (Monk, 1966). Quotas were established for lake whitefish, walleye, northern pike and sturgeon. No commercial fishery exists on the system today.

Table 13: Fishing Regulations for Lake Nipigon

Lake Trout	Standard limit of 2, only one greater than 70 cm (27.6 in.). Conservation limit of 1, any size. Open Season March 01 to September 30.
Northern Pike	Standard limit of 4. Conservation limit of 2. None between 70-90 cm (27.5 in.-35.4 in.) and only one greater than 90 cm (35.4"). Open season 3 rd Saturday in May to April 14. This includes streams flowing into Lake Nipigon up to the first barrier to migration, waters on islands, Bonner Lake, Little Bonner Lake and Jackpot Lake.
Walleye/Sauger	Standard limit of 4. Conservation limit of 2. Only one greater than 46 cm (18 in.). Except Wabinoash Bay and Ombabika Bay - standard limit and conservation limit of 2 with only one greater than 46 cm (18 in.). Open season June 10 to April 14. Includes streams flowing into Lake Nipigon up to the first barrier to migration, waters on islands, Bonner Lake, Little Bonner Lake and Jackpot Lake.
Brook Trout	Standard limit of 2. Conservation limit of 1. Must be greater than 46 cm (18 in.). Open season last Saturday in April to September 15.
Barbless Hooks	Barbless hooks must be used all year.
Artificial Lures	When angling through the ice artificial lures with barbless hooks must be used.
No Possession of Live Trout	No person shall possess any live brook trout or lake trout.
No Stringers or Holding Pens	No person shall possess or use stringers or live holding pens for any species.
Fish Sanctuary	West Bay closed to fishing all year.

Note: Non-resident anglers camping on Crown land are restricted to conservation limits.

Live-in camps were curtailed in the early 1990's and commuter operations were established from various mooring points.

Little sport fishing took place in the Black Sturgeon Lake area until it was accessed in 1937, when a logging road was built to the south end of Eskwanonwatin Lake. In 1941, the road was pushed north to Black Sturgeon Lake. In those days, walleye angling was concentrated on the inlets and rivers along the west shore, especially the Spruce River and anglers seldom fished elsewhere on the lake. Pike were sought after in July and August near the island and inlets and smallmouth bass as large as 4 pounds, were caught near the Forestry and Spruce River Points (Monk, 1966).

Today the sport fishery can be described in similar terms. Angling pressure is very light throughout the system with highest pressure at the access points near Spruce River, Nonwatin, Eskwanonwatin and below the Black Sturgeon Dam just north of Highway 11/17.

Attempts to establish a self-sustaining population of lake trout in Black Sturgeon Lake began as early as 1956. Between 1987 and 1992, eyed eggs and surplus brood stock of lake trout were also stocked sporadically into Black Sturgeon Lake. An assessment done in 1993 and 1994 showed survival of stocked fish but no evidence of reproduction. A detailed plan was developed in 1994, to stock fin clipped yearlings for 10 to 15 years, (until 2010). A closure to lake trout angling is in place while attempting to establish this population.

Tributaries and Surrounding Lakes

There is no history of commercial fishing in the surrounding waters of the Lake Nipigon Basin. Since the early 1990s however, there has been an expanding commercial fishery for smelts. Commercial fishermen are limited to dipnets only where there is an existing smelt fishery for personal use. Where not in conflict with sport fishermen, other gear types have been allowed.

The heaviest sportfishing activity occurs in the area northwest of Lake Nipigon and south of Armstrong on McKenzie, McLaurin, Pishidgi and Wabinosh Lakes with both summer and winter fishing occurring. Most of the other lakes

are accessed in winter only. Of the other lakes in the planning area, significant angling pressure only occurs on Krug (pike), Oskawe (pike), Bonner and Little Bonner (walleye, pike).

Angling occurs in the tributaries where they can be accessed from Lake Nipigon and where there are roads crossing the tributaries around the lake. The new bridge crossing the Little Jackfish River on the Pikitigushi Road has allowed high angling pressure to occur on this previously unexploited section of the river.

Forest Resource Use

Surrounding the Lake Nipigon Basin Signature Site, there are three forest companies holding Sustainable Forest Licences (SFLs). Bowater Pulp and Paper Canada Inc. is the license holder for the Black Sturgeon Forest Management Unit. This Forest is subdivided into distinct parcels. Those bordering the Lake Nipigon forest include; the Sturgeon parcel, located south east of Black Sturgeon Bay and west of the Nipigon River; and the North Sturgeon parcel located southwest of Wabinosh Bay adjacent to the west side of Lake Nipigon.

The Lake Nipigon Forest Management Unit is licensed to Domtar Inc. This management unit was amalgamated with several other management units. These include the former Auden Forest Management Unit, the Kitto and Kilkenney Townships and Orient Bay Peninsula portions of the former Nipigon Crown Management Unit, the Gravel River portion of the former Steel River Crown Management Unit and the western portion of the former Onaman Crown Management Unit. Domtar Inc. is also the licensee for the Armstrong Forest Management Unit. This unit is located directly north of Lake Nipigon. Abitibi Consolidated Inc holds the SFL for the Spruce River Forest Management Unit, located on the west side of the Basin.

Since the early 1920s, the forest industry has played a large role in the economy of the Lake Nipigon watershed. It is generally known that early logging operations concentrated on white pine and spruce logs, and later on spruce pulpwood. The proximity to Thunder Bay and extensive river systems made sections of the forest accessible to early horse logging operations and river drives.

Over the past 50 years, a good deal of cutting has taken place in proximity to Lake Nipigon. Abitibi commenced major cutting northeast of the lake in the Frank Lake area in 1939, and logs were driven down the Ombabika River. The Great Lakes Lumber and Shipping Company cut in the area around Wabinoosh Lake in the 1940s, driving the wood via the Wabinoosh River to Lake Nipigon. Areas to the northwest of Lake Nipigon in the Obonga-Bukemiga area were cut in the early 1950s. The wood was processed into lumber at small portable sawmills that were moved throughout the bush. Between 1948 and 1953, a logging camp and portable sawmill were located in what is now Lake Nipigon Provincial Park. At this time, half of the park's forested area was logged. Birch was harvested for veneer, while black and white spruce and jack pine were harvested for sawlogs.

One of the few logging operations on the islands took place on Shakespeare Island between 1940 and 1950. During the same period, limited saw log operations were also conducted along the northwest shore of Kelvin Island. Both operations were of a very limited nature. Some of the larger islands in Lake Nipigon (especially Shakespeare Island) were also selectively logged in the 1940s and 1950s. At this time, the large pine and spruce were removed for use as boom logs in the log drives of the Lake Nipigon watershed.

Live-in camps were curtailed in the early 1990s and commuter operations were established from various marshalling points. Current harvesting operations have undergone significant changes with the bulk of furnish to the mill complex now being supplied in chip

form either directly from field chipper operations or stationary chipping plants.

Within the current forest management plans (FMP), harvest and salvage allocations for the five-year planning period exist in four of the five enhanced management areas. Approximately 837 ha of salvage, resulting from a 1999 forest fire, is allocated in the Nipigon-Beardmore EMA (E2237r). Black Sturgeon Forest FMP has roughly 1475 ha allocated for harvest and 400 ha allocated for salvage within the South Lake Nipigon EMA (E2252). Only a small harvest allocation (105 ha) exists in the Spruce River Unit. The Pikitigushi EMA (E2251w) falls within the Armstrong Forest where approximately 2190 ha are allocated for harvest.

Mineral Resource Use (Taken from Drost, 2001)

Mineral Deposits and Metallogeny of the Western Lake Nipigon Basin Area

The Black Sturgeon Graben is host to a variety of mineral occurrences. The Black Sturgeon River valley contains known occurrences of uranium, hematite, molybdenum and titanium. The character of the mineralization demonstrates the deep mantle tapping nature of the Black Sturgeon Fault structure.

The coincident occurrence of hydrothermal hematite and uranium is a key mineral association with the iron-rich *Olympic Dam* copper-gold deposit type. The Olympic Dam deposit is the type example in Australia, located in a similar geological environment, which hosts a mineral resource of 2 Billion tonnes grading 1.6% copper, 0.6% grams/tonne gold and 0.06% uranium oxide.

The Black Sturgeon Fault and related rift-graben fault structures in the region, coincide with and were likely conduits to, large mafic to ultramafic (low silica) intrusions which have demonstrated copper-nickel and platinum group element (PGE) associations. These intrusions, such as the Disraeli Lake and

Seagull Intrusions are currently being explored by a series of junior exploration and senior mining companies, particularly in the southwestern and western portions of the Lake Nipigon Basin planning area.

The Black Sturgeon Graben fault system is a key element in the "Noril'sk exploration model" currently utilized as a guide by the various junior and senior mining company exploration programs within the greater Lake Nipigon Basin area. The Noril'sk area in Russia exhibits similar geology and mineral occurrences and has a significant production history for nickel and platinum group elements. The area is the subject of intense exploration interest due to the present price of the metals (Platinum US\$600/oz and Palladium US\$800/oz).

The Noril'sk model applies to the entire Lake Nipigon Basin. The Lac Des Iles deposit off Spruce River Road, just to the southwest of the Lake Nipigon Basin planning area, contains a measured and indicated palladium resource of 7.4 Million ounces (gross value \$6 Billion). The Lac Des Iles Mine, an open pit operation that is presently expanding production, is possibly controlled by east-west trending geological structures which traverse under the Nipigon Plate assemblage. The Lac Des Iles deposit demonstrates the PGE metallogeny and exploration potential of the Lake Nipigon Basin area as a source for PGE metals which are known particularly for their catalytic qualities in air pollution control equipment.

The exploration challenge for Noril'sk-type deposits includes "seeing under" the Nipigon Plate assemblage with advanced geophysical techniques. In addition to geological mapping, stripping, trenching, sampling and geophysical surveys, targets will ultimately require testing by diamond drilling.

Mineral Deposits and Metallogeny of the Eastern Nipigon Basin Area

Archean metasedimentary and metavolcanic rocks exposed on the east side of the Black Sturgeon waterway, are a window through the

Nipigon Plate diabase. They indicate the presence of northeast-southwest trending Beardmore-Geraldton 'greenstone belt' rocks, host to the "Beardmore Gold Camp" on the east side of the Basin. These older rocks transect the Basin and underlie the flat-lying younger diabase rocks of the Nipigon Plate.

Today (2001) the Beardmore area is considered to exhibit high mineral potential for gold exploration in greenstone belt rocks. The area is home to more than 40 active prospectors and much of the local economy is dependent on the exploration activity generated by these professionals. Exploration work such as stripping, trenching, sampling, geophysical surveys, geological mapping and diamond drilling, is conducted by individual prospectors. Junior and senior mining companies conduct similar activities, commonly on ground acquired from the prospectors through option-purchase agreements. This translates to an average expenditure of over \$400,000 per year, for the last 5 years, on grassroots exploration in the Beardmore area.

Water Resource Use (Taken from Swainson, 2001b)

Nipigon River

Power generation is arguably the most disruptive development that has occurred in the Nipigon watershed. The beginning of construction of the Cameron Falls Dam in 1918 marked the first of a long series of physical and environmental changes that would impact the Nipigon Basin forever. Table 14 chronicles the events that affected water levels and flows and a detailed discussion of these events is found in Near (1982) and Atria (1993).

The Cameron Falls Dam was completed in 1920 (Figure 5). It backed up water on the Nipigon River, 23 m (15 ft), creating a new East Arm, flooding out the Narrows, Cedar Rapids, Split Rapids and extending Jessie Lake over the former Basin of Lake Maria. In 1925, the Virgin Falls Dam was built to control water levels in

Lake Nipigon, and to "enable the total flow of the Nipigon River to be utilized for power development as the load requires it" (HEPC, 1927). This created the largest storage reservoir in existence (HEPC, 1931) and raised Lake Nipigon by 15 cm (0.48 ft). A dam had to be built at the end of Black Sturgeon Bay on Lake Nipigon to stop spillage into Black Sturgeon Lake.

In 1930, with the increasing demand for power for the Thunder Bay system due to the new pulp and paper mills, grain elevator construction and the associated increase in population, the next development was built at Camp Alexander, 2.4 km downstream from the Cameron Falls Dam (Figure 5). The Alexander Dam raised the water levels of the river by 18.5 m (60 ft) and flooded out the 2.4 km of white water called Long Rapids from Alexander Falls upstream to the existing Cameron Falls Dam.

Through a 1940 agreement with the United States, approval was given to Canada "to utilize immediately for the increase of power output at Niagara for war purposes, an additional flow of water equivalent to that which will be added to the Great Lakes as a result of diverting water from portions of the Albany Watershed..." (HEPC, 1941). This led to the construction of the Ogoki River Diversion which sent water south into Lake Nipigon. In 1942, the Hydro Electric Power Commission (HEPC) promised the diversion "will increase the power resources of Southern Ontario and Quebec and improve levels of the Great Lakes for the benefit of Canada and the United States.

The Waboose Dam was built on the Ogoki River in 1942 (Figure 10). This flooded the waters back to the height of land where a channel was created to allow the water to flow south. The Summit Control Dam was built across this channel. From this dam the water flows through a series of lakes into the Little Jackfish River and subsequently into Lake Nipigon (Near, 1982).

The diversion increased flows in the Little Jackfish River by 113 m³/s and turned this minor stream turned into an excavated soft, wide channel. It is estimated that 30 million cubic yards of sediment were released from the Little Jackfish River between 1943 and 1972. This resulted in 9 m of sediment being deposited near the river mouth in Ombabika Bay (Holmes, 1976).

The Ogoki diversion increased the Lake Nipigon level by 35 cm, and increased the flows by 50%, in the Nipigon River. The two existing generating plants on the river could not use this water efficiently, which in turn led to the construction of the Pine Portage Dam (Figure 5).

The completion of the Pine Portage Dam in 1950 raised the water level on the Nipigon River by 31 m (100 ft) and flooded out almost 16 km of white water, rapids and waterfalls including: the White Chutes, Victoria, Canal, Devil, Rabbit and Miner's Rapids. Lake Emma and Hannah were both flooded out and the whole area renamed Forgan Lake. The Pine Portage Dam raised the Lake Nipigon water level by 12 cm, flooding over the Virgin Falls Dam.

Until 1990, the dams on the river were operated by Ontario Hydro for the sole purpose of generating electricity, restricted by only their legal flooding rights. In 1990, when it was demonstrated that fluctuating water levels on the Nipigon River and excessive drawdown was killing developing brook trout in the spawning beds, an interim flow agreement was reached.

In May 1991, in response to an April 1990 landslide on the Nipigon River, Ontario Hydro put further restrictions on their rate of flow reductions ensuring that flows were reduced in stages to reduce scouring of the river banks (Atria, 1993).

By 1994, a long-term Nipigon River Water Management Strategy was developed. From this strategy, an Operating Plan to guide the day to day dam operations has recently been developed, and will be released to the public in 2001.

The area is home to more than 40 active prospectors and much of the local economy is dependent on the exploration activity generated by these professionals.

Black Sturgeon River

The Black Sturgeon River, being 100 km long, with a drop of 77 m was identified by Ontario Hydro as having one potential site for hydroelectric development, but preliminary estimates showed unacceptably high site development costs. (Near, 1982).

Historically there were three dams on the Black Sturgeon River, all built to facilitate log driving. Split Rapid Dam was built in 1937 at the outlet of Black Sturgeon Lake, Dolan's Dam or Camp

1 Dam, built in 1937 at the outlet of Eskwanonwatin Lake and Black Sturgeon Dam, built in 1959. (Figure 10). Only the Black Sturgeon dam, located just north of Highway 11/17, is currently being maintained. It is now used for sea lamprey control purposes.

Other Tributaries

A hydroelectric power dam was built on the Namewaminikan (Sturgeon) River in 1992, creating a 7 km long reservoir. It has never operated due to financial and technical

Table 14: Chronology of events and impacts on water levels and flows, Lake Nipigon and Nipigon River. Sources: Near, 1982 and Atria, 1993

<i>Year</i>	<i>Event</i>	<i>Impact</i>	
		<i>Lake Nipigon</i>	<i>Nipigon River</i>
1920	Cameron Falls Dam	• no impact	• Raised water 23 m, eliminated the Narrows, Maria Lake and Split Rapids • Created head pond 19 km long up to White Chutes
1925	Virgins Falls Dam	• increased level by 15 cm • created world's largest storage reservoir	• Some of swift water between falls and lake were flooded
1930	Alexander Dam	• no impact	• raised river 18.5 m eliminated 2.5 km of waterfalls and rapids up to Cameron Falls
1943	Ogoki Diversion	• raised level by 35 cm	• increased flow by 50% from average 230 m³/s to 340 m³/s
1950	Pine Portage Dam	• raised level by 12 cm	• raised level by 31 m eliminated 16 km of whitewater, rapids and waterfalls including White Chute, Victoria, Devil, Rabbit and Miner's Rabbit Falls • Lake Emma and Lake Hannah were flooded over and renamed Forgan Lake • Flooded over Virgins Falls Dam which was partially dismantled.
OVERALL IMPACT		• total lake level change from pre-dam to present = 62 cm	• total fall of river = 77 m • Lake Nipigon to Lake Superior: • total fall developed = 72.5 m • total fall not developed = 4.5 m

difficulties. In 1993, the earthen dam was breached and tons of sediment washed downstream and into Lake Nipigon.

In addition to the proposed dam on the Little Jackfish River, a site on the Gull River, two miles west of the Gull River Community, was identified as having potential for development (Near, 1982). It would require a 10 metre high, 200 metre wide dam to be built to concentrate the head, which would block fish migration. Gull Bay First Nation is currently considering construction of hydroelectric facilities on rivers flowing in to the western side of Lake Nipigon. (R. Pinder, pers. comm.).

Recreational Resource Use ***(Taken from Kuntz, 2001)***

Recreational resource use can be grouped into the following categories: fishing, hunting, canoeing, kayaking, cottaging, snow route activities, camping, swimming, and ice climbing (Figure 15).

Fishing

Fishing has been and continues to be a very important recreational activity in the Lake Nipigon Basin. Commercial tourism operators have existed on Lake Nipigon since the early 20th century. Fishing charters continue to be an important part of the economy to local residents. These charter boat operators offer day-trips and over-night opportunities for individuals and groups (up to 12) of people. A number of resorts offer motorboat rentals, housekeeping cabins and one resort rents an outpost cabin on Shakespeare Island (Table 15). Brook trout, lake trout, lake whitefish, walleye and northern pike are among the more sought after sport fish species.

Popular angling areas on Lake Nipigon include: the Virgin Islands, South Bay, GrosCap, Jackfish and the north central islands for brook trout; McIntyre, Chief and Gull Bays for northern pike; and the Wabinosh, lower Ombabika, Little Jackfish, Pikitigushi and Poshkokagan Rivers for walleye. Shakespeare

Island is a popular site for both brook trout and northern pike. Mungo Park Point is known for brook trout and walleye, while Humboldt Bay, the Namewaminikan River and the central islands region provide opportunities for walleye and northern pike (Gollat, 1975). The main areas that are accessible by road are Pijitawabik Bay, Poplar Point, High Hill Harbour, South Bay, Gull Bay, Chief Bay, Ombabika Bay, Humbolt Bay, Onaman River and the Poshkokagan River.

In general, fishing for brook trout is most common from ice-out until late June. Walleye is typically a mid June to late summer fishery. Lake trout angling is concentrated around Poplar Point, Shakespeare Island and South Bay in the spring and extending into July. Northern pike angling occurs throughout the summer and tends to sustain the recreational fishery through July when most other species are relatively unavailable.

Hunting

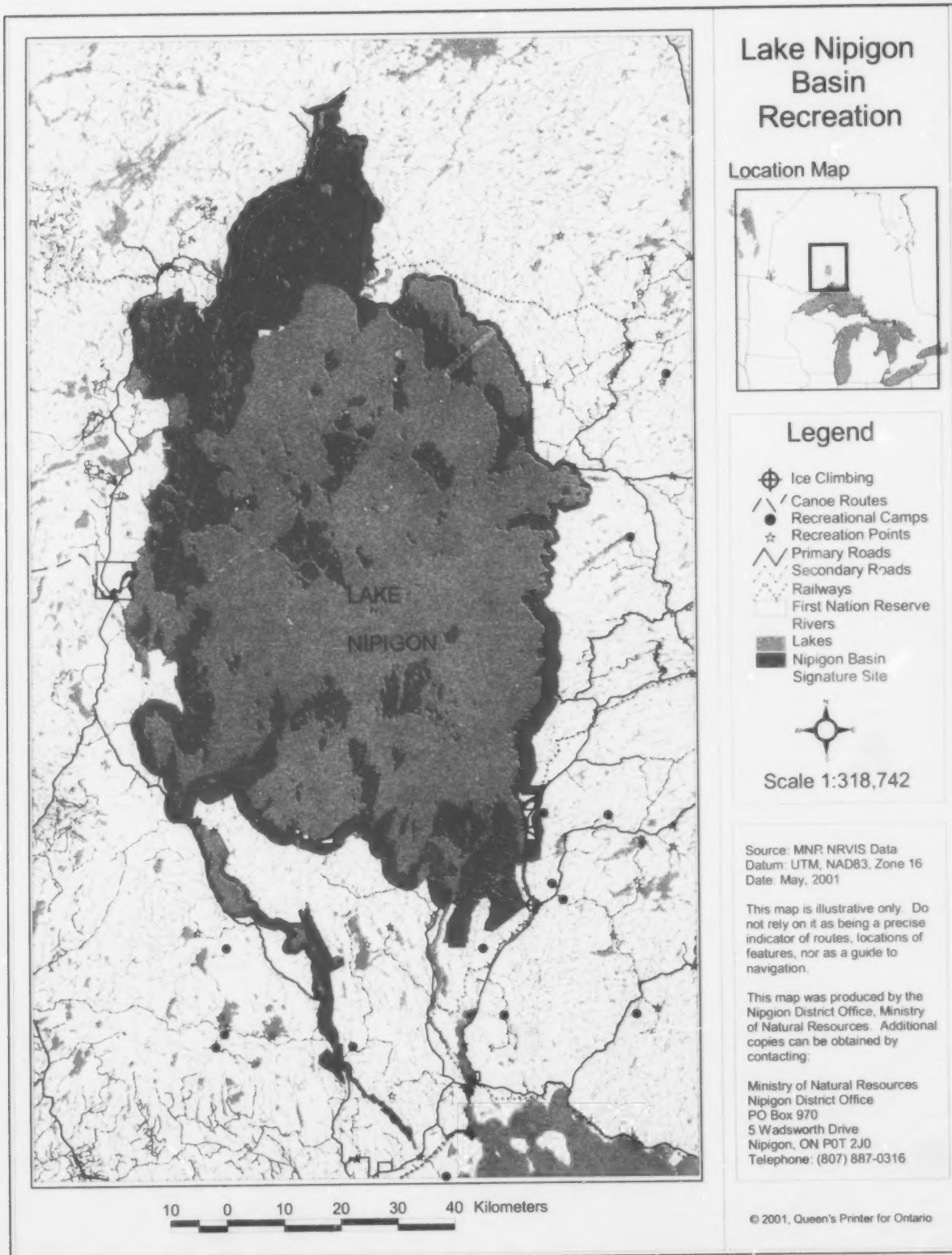
There are seven known charter boat operators that cater to moose and bear hunting (Table 15). Deer, moose and bear seasons provide commercial and local hunting opportunities within the Lake Nipigon Basin. The Lake Nipigon Islands make up Wildlife Management Unit 20 (WMU 20), where hunting for small game only is permitted. Moose tags are allocated on a per unit basis for the six other Wildlife Management Units that surround Lake Nipigon.

Wildlife Viewing

Although it is difficult to assess the level of activity, wildlife viewing and appreciation does occur in the Nipigon Basin, often in conjunction with other activities such as angling, camping, canoeing and boating. The pristine and remote character of the Basin certainly lends itself to this activity with a fairly high chance of viewing animals such as a bald eagle, pelican, moose or fox.

***Fishing has been
and continues to be
a very important
recreational activity
in the Lake
Nipigon Basin.
Commercial
tourism operators
have existed on
Lake Nipigon since
the early 20th
century.***

Figure 15 - Recreation



Camping/Swimming

The lake provides a substantial number of opportunities for summer camping and extended wilderness experiences. At present, there are at least 40 documented remote campsites being regularly used in the Signature Site. Organized camping occurs at Poplar Point Campground on the east shore of Lake Nipigon. This municipally run campground is well used by residents of the surrounding communities as well as Americans who mainly come to fish. The campground has an excellent swimming beach, which is used by overnight campers as well as on a day-use basis

Canoeing/Kayaking

Canoe routes that begin inland and terminate in Lake Nipigon include the Namewaminikan, Blackwater, Whitesand, Pikitigushi, Little Jackfish, Gull (Kiashke) and Kabitotikwia Rivers. The Whitesand River (P2253) can be accessed via Jojo Lake or Pikitigushi River and provides an inland link to the interior of Wabakimi Park. The Nipigon River and Black Sturgeon River also offer canoeing opportunities (Figure 15). There are commercial outfitters who do provide gear and/or guides for paddling in the Lake Nipigon Basin.

Table 15: Tourist Outfitters on Lake Nipigon

<i>Outfitter</i>	<i>Service(s)</i>
Royal Windsor Lodge	Boat and motor rental Bait Cabins (incl. outpost cabin on Shakespeare I.) Outfitting for canoe trips Fishing, bear and moose hunting
Onaman River Resort	Boat and motor rental Camping Housekeeping cabins Moose and bear hunting Access facilities
McCollum's Reflection Lake Cabins	Cabins Cruiser service Fishing and guiding Bear and moose hunting
Taisey's Cabins Cabins	Cruiser service Bear and moose hunting
Nighthawk Charters Cruiser service	Extended and day charter for groups Fishing May 15 to Sept. 15 Moose hunting
Gerry Adams	Cruiser service
Shadow Mountain Charters	Extended charters – fishing and hunting
Hooker Charter Service	Daily fishing charters
Paul's Charter Service	Extended charters – fishing and hunting
R & R Charters	Extended charters – fishing

(Source: OMNR, 2000)

The Black Sturgeon River is very popular with whitewater enthusiasts from Thunder Bay. Canadian Outward Bound Wilderness School runs whitewater kayaking and canoeing courses on the 8.5 kilometre section of the Black Sturgeon River between Black Sturgeon Lake and Nonwatin Lake. Smaller rapids also exist down river on the rest of the Black Sturgeon. The high volume of discharge through the Little Jackfish River creates larger standing waves and rapids and has been paddled by more experienced kayakers. The Little Jackfish River may have potential for commercial whitewater rafting.

Cottaging

Cottaging development (seasonal recreational development) occurs at Poplar Point, Orient Bay, McIntyre Bay and South Bay on Lake Nipigon and MacKenzie and Waweig Lakes south of Armstrong. In addition, there is a Boy Scout Camp at Forgan Lake and the Canadian Outward Bound Wilderness School on Black Sturgeon Lake. Three private camps exist on the Nipigon River, two at Parmashene Park (part of Lake Helen Reserve) and one just south of Alexander Dam. Approximately 15 camper trailers are parked on the water power lease at the south end of Jessie lake.

Snow Route Activities

The Ontario Federation of Snowmobile Clubs (OFSC) operates an 18,000 kilometre border to border system called Trans Ontario Provincial (TOP) Trails. The TOP trail crosses the Basin in two places. The "AD" Trail crosses the Black Sturgeon River Provincial Park near the southern extreme of the park. The "A" Trail crosses the Nipigon River at the Cameron Falls hydro generation station. Logging roads, hydro lines and natural gas pipelines are also used by snowmobile enthusiasts. The Black Sturgeon Road provides one popular access to these informal trail networks.

The Canadian Outward Bound Wilderness School (COBWS), a non-profit educational organization specializing in outdoor adventure, operates a year-round facility on Black Sturgeon Lake located in Black Sturgeon River Provincial Park. The school offers 8-day dog sledding and cross-country skiing trips in the winter and summer rock climbing and kayaking trips.

Ice Climbing

Ice Climbing in Orient Bay is a very popular activity among the climbing community in Thunder Bay. Ice Fest, an event that attracts local, continental and overseas ice climbers in mid-March has been held annually since 1987. There has been international tourist travel from Germany and Japan to ice climb in Orient Bay (Parent, 1993). Although the Orient Bay site is very easily accessed via Highway 11, there are currently no facilities in place to accommodate these users (parking lot, washrooms, information kiosk, etc.). At least one commercial ice-climbing outfitter provides guided trips to Orient Bay. The north shore of Nonwatin Lake is also used for ice climbing activities most notably by the Canadian Outward Bound Wilderness School.

Many of these ice climbing routes are also used for rock climbing in the summer. It is highly probable that the steep cliffs, buttes and mesas common throughout the Lake Nipigon Basin area could also provide excellent rock and ice climbing opportunities.

7. Market Analysis

(Taken from Van-Wagoner, 2001)

Market Demand

Tourism has become a key component in the Ontario economy. It directly creates jobs in the accommodation field, supports many businesses in the service and retail sectors, and contributes to the demand for new and improved recreation and entertainment facilities which residents can enjoy.

The tourism impacts in Ontario are substantial. Government published information indicates that:

- direct tourism expenditure in Ontario (1998) accounted for \$15.9 billion in tourism expenditures, spent by 106.9 million visitors;
- direct employment is estimated to exceed 270,000 person years; and
- total employment related to the effects of tourist expenditures are estimated to exceed 460,000 person years (including direct, indirect and induced effects).

In addition, tourism has become an important industry in northwestern Ontario. The available government data pertaining to the North of Superior Travel Region, in which the Nipigon Basin falls, suggests that:

- tourists are responsible for an estimated \$221.7 million of direct expenditure annually;
- direct employment is estimated to exceed 4,148 person years; and
- total employment related to the effects of tourist expenditures are estimated to exceed 6,503.8 person years (including direct, indirect and induced effects).

In general, tourism attractions, facilities and services within the study area are drawing from the base of existing travel to Northwestern Ontario. That is to say, tourists are first deciding to travel to Northwestern Ontario and then selecting products in the Nipigon area from among available options within Northwestern Ontario.

Information about the existing level of travel to Northwestern Ontario, particularly the North of Superior Travel Region, and projections of future Northwestern Ontario travel, are believed to be relevant measures of the current and future potential market demand for the Lake Nipigon Basin area. Table 16 indicates the following regarding market demand:

- approximately 1,140,000 visitors, of a total of 2,577,000 Northwestern Ontario visitors, traveled within the North of Superior Travel Region;
- the majority (56.9%) of the 1,140,000 North of Superior visitors were Ontario residents, with most living within Northern Ontario;
- other Canadian residents contributed 72,000 or 6.3% of the total travel to the North of Superior Region;
- visitors from the United States were the second largest group at 381,000 or 33.4% of the total visits to the NOSTA region; and
- Overseas visitors represented only 3.3% of total NOSTA Region travel (38,000) visits.



Tourism directly creates jobs in the accommodation field, supports many businesses in the service and retail sectors, and contributes to the demand for new and improved recreation and entertainment facilities

Table 16: Visitor Origins to the North of Superior Travel Area (1998)

<i>Visitor Origins</i>	<i>NW Ontario (Number of Person Trips)</i>	<i>Percent of Total</i>	<i>North of Superior (Number of Person Trips)</i>	<i>Percent of Total</i>
Ontario	1,130,000	43.8%	649,000	56.9%
USA	1,018,000	39.5%	381,000	33.4%
Other Provinces	387,000	15.0%	72,000	6.3%
Other Countries	42,000	1.6%	38,000	3.3%
Total	2,577,000	100.0%	1,140,000	100.0%

Source: Ontario Ministry of Tourism

Market Trends

Some interesting trends are apparent in the tourism industry. Over the next 5–10 years, the richest pre-retirement and retirement individuals in the history of North America will be spending some of their discretionary income on travel. These travelers are generally older, healthier, better traveled, more demanding, and possessing more disposable income than their predecessors. They are looking for new and different destinations offering unique cultural experiences and contact. They are more aware of Native Issues, creating a greater interest in Native history and culture.

The number of overseas visitors to Canada has grown steadily since 1980 at a rate of about 3% per year. By 1998 some 32.2 million overseas visitors were expected annually. Four key international markets currently show strong growth potential – United Kingdom, France, Germany and Japan.

There is a growing interest in various forms of outdoor recreation, often in unusual, exotic and remote destinations. Participation in this so-called “adventure travel” is growing at 15%–20% per year, primarily in soft, safe adventure vacations that combine adventure by day and comfort by night without the hardships of traditional wilderness adventure travel. Travelers are also looking for vacations that bring them

closer to the environment and/or provide them with the opportunity to be conservationists. This is generating interest in learning about, protecting and experiencing natural resources through interactive study tours.

Visitor Profiles

Table 17 summarizes available information about the travel characteristics of Ontario residents traveling to the North of Superior Region and staying at least one night. Clearly, automobile travel is the most common mode of travel (91% of person trips), and stays of 1–3 nights are the most popular (65% of person trips). In 1991, more than half a million (526,000) person-nights were spent camping, while more than 1.5 million were spent in rental cabins or hotels/motels. Furthermore, the single most important reason Ontario residents traveled to the North of Superior Region and stayed at least one night was for recreation/pleasure, which was the motivation for approximately 785,000 person trips in 1991.

Table 17: Visitor Profiles (1991)

<i>Visitor Characteristic</i>	<i>Number of Visitors</i>	<i>%</i>
<i>Mode of Travel</i>		
Auto	1,622,000	91%
Other	161,000	9%
<i>Length of Stay</i>		
1-3 nights	1,159,000	65%
4-9 nights	446,000	25%
10+ nights	178,000	10%
<i>Accommodation</i>		
Camping	526,000	6%
Rental cabin	967,000	12%
Hotel/motel	639,000	8%
Other	6,064,000	74%
<i>Trip Purpose</i>		
Recreation/pleasure	785,000	44%
Visiting friends & relatives (VFR)	446,000	25%
Other	552,000	31%

Nipigon Basin Tourism Potential

It is estimated that the level of tourism in the Nipigon Basin area in the year 2000 was 73,000 person nights and 30,000 person day trips with \$4.3 million of direct tourism expenditures generated and 140 person years of total employment (direct, indirect and induced). However, it is expected that the total employment impacts may extend beyond the boundaries of the local area.

In estimating the level of use expected for the Nipigon Basin, it is important to assess the success of other similar area attractions. As outdoor oriented tourist attractions, Sleeping Giant and Ouimet Canyon Provincial Parks provide a good indication of the general visitation level which may be expected for the Lake Nipigon Basin. The levels of new overnight visitation will resemble the level generated by Sleeping Giant, but will use the facilities available in the Nipigon Basin. This volume is expected to reach 27,000 person

nights (approximately 16,000 Ontario residents and 11,000 from non-resident sources). In addition, the Lake Nipigon Basin Signature Site can be expected to attract approximately 8,000 person nights from tourists with an interest in history and culture and approximately 11,000 person nights through extended stays of visitors which would have stopped over even without highlighted attractions in the Basin. It is expected that the level of new overnight visitation will fall between 27,000 person nights and 46,000 person nights.

These volumes represent an increase of between 37% and 63% for overnight visitation and between 50% and 83% for day visitors. These potential increases are large, but the volumes represent a small share of the total North of Superior visitation. The growth should be attainable because the existing volume has been achieved despite a low level of promotion, amenities and activity options for visitors.

8. Constraints and Capabilities

(Taken from Bluth, 2001b)

Constraints

The goal for the Lake Nipigon Basin Signature Site has been identified as follows:

"To protect, enhance and where necessary, restore the natural ecosystems, populations and wilderness quality of the Lake Nipigon Basin while allowing for tourism, recreational and industrial development that will not compromise the integrity and environmental values of the Basin ecosystem."

The consideration of constraints and capabilities is an important step in determining development opportunities that will not compromise the primary intent of protection. On a broad scale, development constraints within the Basin include terrain limitations (e.g. swampy, unstable slopes, rugged topography), sensitive wildlife habitat (e.g. caribou calving grounds, bald eagle nesting sites), fish spawning/rearing habitat, culturally sensitive sites (e.g. burial grounds, known archaeological sites), sites with rare/significant flora and/or earth science features.

Terrain limitations are simply physical features of the landscape that make development, whether it is a campsite, trail or building, difficult or impossible. The other features identified are constraints because their significance and/or sensitivity limit the type of use or development (if any) that can take place on sites where these features occur.

Other constraints that must be considered in identifying recreational development potential, is the consideration of existing planning and development controls. The boundary of the recently amalgamated Regional Municipality of Greenstone incorporates a large portion of the eastern shoreline of Lake Nipigon, from

Dorothea Township to Orient Bay. The municipality will be developing an Official Plan over the next couple of years that will have implications on what activities can occur in this area. Other plans that must be considered in development decisions for the Basin include: Ontario's Living Legacy Land Use Strategy, which provides direction for the proposed protected areas within the Lake Nipigon Basin (see Appendix A); the Nipigon District and Thunder Bay District Land Use Guidelines; the current Integrated Resource Management Plan for Lake Nipigon; and Ontario Parks Planning and Management Policies. Furthermore, all current legislation such as the Environmental Assessment Act, Public Lands Act and Endangered Species Act, must be adhered to when making decisions regarding development in the study area.

Capabilities

Capabilities within the Lake Nipigon Basin can generally be described as terrain conducive to recreational development (dry, good drainage, sandy beaches), accessibility, interconnecting waterways, high quality sport fishing, high quality wildlife viewing opportunities, landscape diversity, remote wilderness setting, cultural richness, trail and viewing opportunities.

A preliminary review was conducted of shoreline landscape development potential in the Basin, using the Ontario Land Inventory and Northern Ontario Geologic Engineering Terrain Study maps. This was a very preliminary look at landscape development potential. The results of this study will have to



Terrain limitations are simply physical features of the landscape that make development, whether it is a campsite, trail or building, difficult or impossible.

be verified through aerial photo interpretation and site visits. The identification of areas with potential was based solely on landscape information and did not consider any constraints such as ecological or cultural features. Results indicate that a diversity of recreational landscapes exist. These landscapes could support activities such as hiking, camping, boating, beach activities, ice/rock climbing, nature appreciation, cottaging and angling.

The review indicates that all of the protected areas that incorporate shoreline (all but E2252a) have potential for shoreline development, some to a greater degree than others. C2247, by virtue of its large size, offers the most opportunities. These opportunities include structural development potential for campsites, kiosks and access points, etc. There is also a canoe route opportunity in the Castle Lake area on the West Shore of Lake Nipigon. This area offers some scenic and diverse back country landscapes with canoeing, hiking and nature appreciation opportunities.

Preliminary analysis indicates that some excellent canoeing opportunities exist in the northern portion of E2257r around Wabinoosh, Waweig and McKenzie Lakes, featuring rugged landscapes, interconnecting lakes and road access. Canoeing opportunities also exist along the Pikitigushi River and Whitesand River, which can be accessed via the rail line and from Lake Nipigon.

E2237r, having been identified in the Land Use Strategy for tourism development, may offer a number of areas with terrain conducive to development such as Bish Bay, North and South High Hill Harbour and Grant Point Harbour. These preliminary findings will have to be investigated further in the field. This portion of the lake is accessible by the Poplar Point and High Hill Harbour roads.

Black Sturgeon River Provincial Park (P2250) has very high recreational potential due to the easy road access and excellent landscape features. Much of the area has been field checked and ranks a 3 on the Ontario Land Inventory maps for recreational potential. This ranking indicates that the Black Sturgeon area offers significant recreational features with the potential to support fairly intensive recreational use. Numerous swimming beaches, excellent canoeing and boating opportunities as well as ice/rock climbing potential have all been identified within this area.

9. Issues

The Project Team has identified a list of specific issues that need to be addressed in the management strategy for the Nipigon Basin. This list is subject to public and stakeholder review and issues may be redefined or new issues added to the list.

Aboriginal Communities

- Local Aboriginal communities have a number of interests in portions of the Basin, including land claims, resource development and tourism development interests. Aboriginal and treaty rights on Crown lands are protected by the Constitution of Canada. Conflicts may arise between the desires of the Aboriginal communities to meet their objectives for economic development and resource use and the objectives of the OLL strategy.

Access to Lake Nipigon

- Although a small number of access points exist on the lake, few have facilities such as parking, docking, boat ramps, waste disposal or washrooms. Some people want improved facilities and access while others are concerned of the resulting impact on the Lake ecosystem.
- Need to address access point use and management for the following access points: Poshkokagan River, South Bay (2 sites), MacDiarmid MNR Base, Lake Nipigon Provincial Park, Onaman River, Humbolt Bay (2 sites), Ombabika Bay, Pine Portage and Pishidigi; currently listed as "public access" in the Lake Nipigon Integrated Resource Management Plan.
- The creation of new or upgrading of old access points to Lake Nipigon through logging or mining activities.
- Access for Armstrong residents to the north end of Lake Nipigon.

Forest Management

- Wood supply is tight in the Northwest Region of Ontario.
- Forest management activities are ongoing in the enhanced management areas and may limit the management options for these areas available through this planning exercise.
- Conflict may arise between the public and forest industry with regard to modifying operation for the achievement of protection (e.g. viewsapes, buffers).

Mining

- The Beardmore-Geraldton "greenstone belt" has been the site of intensive mineral exploration and development in the past. This belt of high mineral potential, known in particular for its gold prospects and occurrences, runs from east to west across the southern portion of Lake Nipigon; a similar belt traverses the northern portion of the lake.
- The Black Sturgeon Fault and related rift-graben fault structures in the region, coincide with and were likely conduits to, large mafic to ultramafic (low silica) intrusions which have demonstrated copper-nickel and platinum group element (PGE) associations. These intrusions, such as the Disraeli Lake and Seagull Intrusions, are currently being explored by a series of junior exploration and senior mining companies, within the Nipigon Plate assemblage, particularly in the southwestern and western portions of the Nipigon Basin planning area.
- The Black Sturgeon Graben fault system is a key element in the "Noril'sk exploration model" currently utilized as a guide by the various junior and senior mining company



Local Aboriginal communities have a number of interests in portions of the basin, including land claims, resource development and tourism development interests.

exploration programs within the greater Nipigon Basin area. The Noril'sk area in Russia exhibits similar geology and mineral occurrences and has a significant production history for nickel and platinum group elements. The Nipigon Basin area is the subject of intense exploration interest due to the present price of the metals (Platinum US\$600/oz and Palladium US\$800/oz).

- The Noril'sk model applies to the entire Nipigon Basin. The Lac Des Iles deposit off Spruce River Road, just to the southwest of the Nipigon Basin planning area, contains a measured and indicated palladium resource of 7.4 million ounces (gross value \$6 billion). The Lac Des Iles Mine, an open pit operation which is presently expanding production is possibly controlled by east-west trending geological structures which traverse under the Nipigon Plate assemblage. The Lac Des Iles deposit demonstrates the PGE metallogeny and exploration potential of the Nipigon Basin area as a source for PGE metals which are known particularly for their catalytic qualities in air pollution control equipment.
- Land use designations within the Lake Nipigon Basin have been designed to minimize impacts on the high mineral potential areas (e.g., Lake Nipigon-Beardmore EMA), although it is not possible to avoid all such areas. Proposed protected areas having provincially significant mineral potential may be available for controlled mineral exploration, subject to future policy development. Conflict may arise between the public and the mining industry with regard to modifying operation for the achievement of protection.

Wildlife

- No detailed inventory work has been conducted for insects, birds, amphibians, reptiles or small mammals. The lack of information makes management difficult.
- No long term monitoring occurs for for insects, birds, reptiles, amphibians or mammals.
- Increasing human use of the Lake Nipigon Basin could result in declining nesting success of white pelican and bald eagle (both endangered), two species which require isolation.
- White pelican and bald eagle populations are increasing in the Lake Nipigon Basin. Fishermen are concerned that these fish-eating birds are negatively impacting fish populations.
- Some feel that island summer caribou habitat should be actively managed through use of prescribed burning whereas others want it to be left to nature.
- Caribou are particularly subject to human disturbance and habitat destruction. Increased use of the Lake Nipigon Basin for tourism and recreation may have a negative impact on the threatened caribou.
- Caribou rely on the islands of Lake Nipigon for critical calving habitat. Conflict may arise between the desire to use the islands for tourism/recreation and the need to protect the caribou population from further decline.
- Orient Bay/Pijitawabik Palisades is a particularly significant area for bats. A hibernaculum is suspected in the area but has not been confirmed. Recreational use of the area could inadvertently lead to disturbance of the hibernating bats if the hibernaculum is not found.
- The Land Use strategy references the option of introducing a primitive weapon hunting season for big game on the islands. The moose populations are low and may not be able to sustain additional hunting beyond the current level of subsistence hunting by Aborigines.

Fish and Fisheries

- Some sport fishermen would like to see the commercial fishing licences bought out. Commercial fishermen want to continue to commercial fish.
- Commercial fishermen want to use gill nets while anglers are requesting that they use trap nets or pound nets.
- Waste of non-marketable fish (ling, suckers) caught in the gill nets is occurring.
- The existence of lake wide quotas as opposed to zone quotas limits management options.
- Lack of information on fish stock status, movement patterns and genetics hampers effective management.
- Incidental catches of lake trout by commercial fishermen is unavoidable with current fishing techniques.
- Conflict exists between sport fishermen and commercial fishermen over the allocation of lake trout.
- Impact of incidental catches of brook trout by commercial fishermen is unknown.
- Commercial fishermen have requested to "trade" their northern pike quotas for additional commercial quotas of another species.
- No rehabilitation efforts, studies or recovery plans have been initiated/completed for sturgeon (species of special concern), shortjaw cisco (threatened) or sculpin (threatened).
- The impact of smelt introductions on the aquatic ecosystem of Lake Nipigon is unknown.
- Requests to trawl for smelt raises concerns regarding the impact on non-target species and disruption of the substrate.
- There is currently no method to regulate the amount of fish killed by sport fishermen on Lake Nipigon.
- Lack of angler education results in improper fish handling techniques and emphasis on traditional game species only.
- Sport fishing quality on Lake Nipigon has deteriorated.
- The walleye and brook trout fishery is still degraded and inadequate protection exists.
- There is no accurate estimate of the level of subsistence harvest.
- Black Sturgeon Lake is providing very few angling opportunities relative to its size.
- The impact of the Black Sturgeon Dam on fish migration is unknown.
- There is some concern that the commercial lake trout quotas is too high.
- There is a lack of information about the tributaries and surrounding lakes in the Signature Site study area which hampers effective management, e.g. accurate location of barriers to fish migration.
- Direction for EMA 2252a provides for protection of the tributaries into Lake Nipigon. This direction is not specifically identified in the other EMAs around the Lake.
- Very little is known about the level of baitfish harvest within the Lake Nipigon Basin.

Tourism

- Conflict between development versus protection.
- There is currently no control mechanism for the number of house boats/cruiser boats that use Lake Nipigon however their impact may be significant.
- There is a lack of information regarding the type and level of tourist activity in the Nipigon Basin.

Crown Land Use

- Actual number of Crown land campsites within the Lake Nipigon Basin and their level of use is not known.
- Level of Crown land use and types of use (hiking, camping, snowmobiling, etc.) has not been assessed.

- Requests for Land Use Permits for Crown land recreation may conflict with the need to protect the ecosystems of the Lake Nipigon Basin.
- Impacts of current Crown land uses have not been inventoried e.g. garbage, erosion, soil compaction, destruction of vegetation, wildlife habitat degradation, etc.
- Land Use Permit holders in conservation reserves want the option to purchase their properties.

Cottaging

- Sale of Crown land for new cottage development in conservation reserves or parks is not permitted by policy but will be considered in the Lake Nipigon-Beardmore and Gull Bay EMA's, on environmentally suitable sites. Conflict may arise between those who would like to see this development and those who don't want it.
- There will likely be pressures to develop elsewhere in the Lake Nipigon Basin aside from the EMA.
- Private land development could impact the sustainability of the Basin's resources.

Water Resources and Use

- There is continued habitat degradation occurring in the Little Jackfish River and Ombabika Bay due to erosion from increased water flows.
- Draw-down continues to impact the productivity of the Nipigon River by stranding fish and exposing aquatic invertebrates to dessication.
- There is no recent water quality, zooplankton or benthos information for the water conservation reserves on Lake Nipigon and a lack of recent data for Lake Nipigon tributaries, Black Sturgeon Lake, Black Sturgeon River and Nipigon River. Nor is there standardized sampling protocols or long term monitoring stations for these waters.
- There are no formal water quality objectives linking Lake Nipigon with the Lake Superior Management Plan.
- There is currently poor interagency transfer of limnological and contaminant monitoring data.
- The contaminant levels are elevated in at least some species of fish in all water systems in the study area. The public is not well aware of the consumption restrictions.
- Proposals for hydro electric development on tributaries to the Lake Nipigon Basin could have negative impacts on fish or fish habitat.

Appendix 1

This appendix includes excerpts from the *Ontario's Living Legacy Land Use Strategy*, providing area descriptions and land use intent for each of the proposed provincial parks, conservation reserves and enhanced management areas within the Nipigon Basin Signature Site.

The ID letters and numbers reference the land use areas that are shown on Figure 1 (page 3) as well as the individual area maps in the appendix.

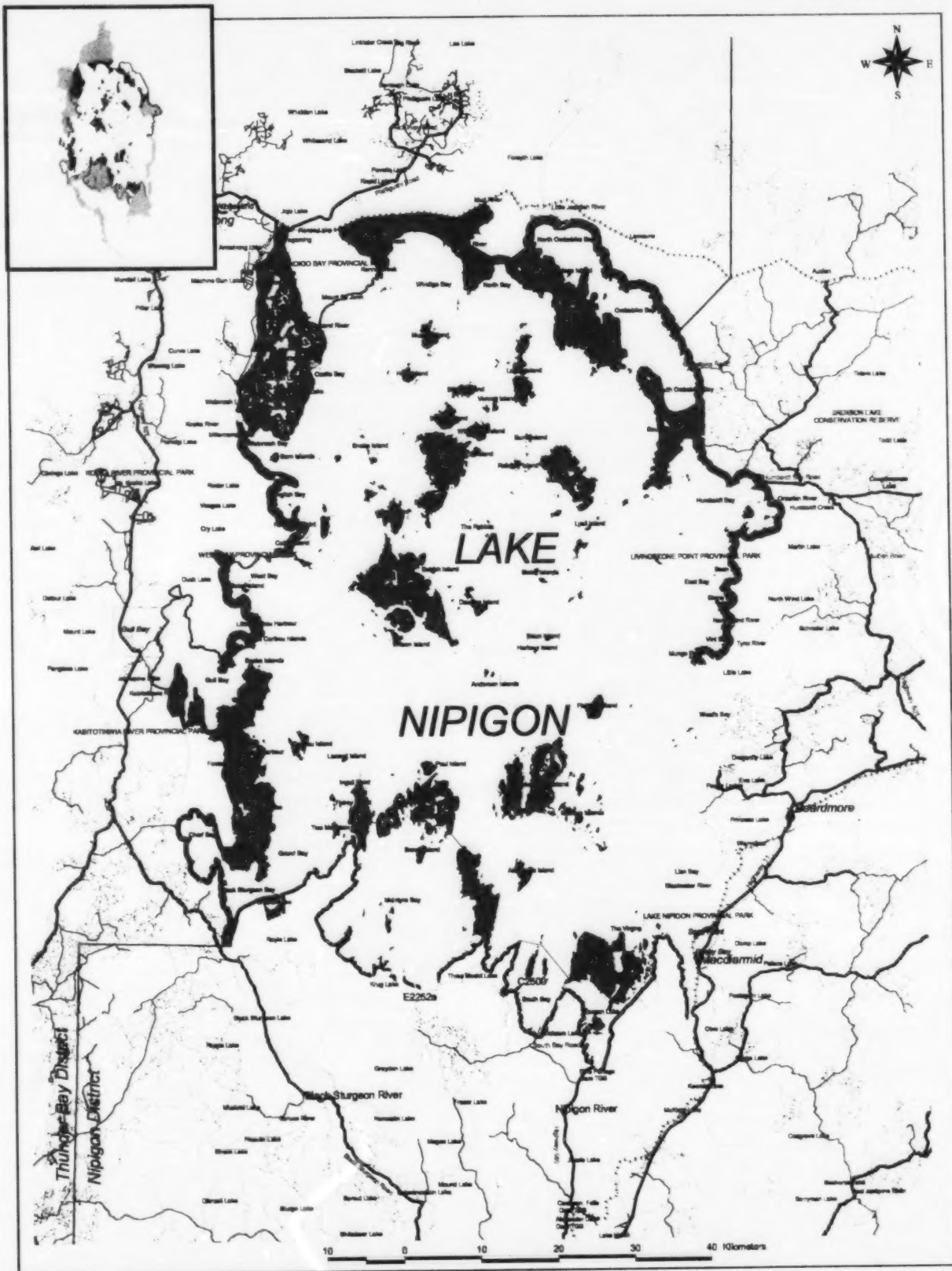
ID: C2247
Name: Lake Nipigon
Area (ba): 133,874
Designation: Conservation Reserve

Area Description:

The southern and northern portions of Lake Nipigon contain high recreation potential, diverse wildlife habitat and plants reaching their northern limits. The northern portion is a major caribou habitat area and travel corridor. This large area contains a wide variety of representative landform and vegetation types. This area includes all Crown islands and the majority of the shoreline of Lake Nipigon.

Land Use Intent:

Big Game hunting on the islands is currently prohibited by regulation. It is recommended that the southern islands be regulated as a primitive weapons hunting area and that hunting continue to be prohibited on the northern islands. To promote the renewal of ecosystems, natural fires should be allowed to burn on the islands where no human or structural values are at risk. Intent for Geikie Island is to retain its Crown Game Preserve Status. Intent for Outer Barn Island is to rescind the Wilderness Area Act regulation. Commercial Fishing and associated traditional facilities will be allowed to continue, subject to existing regulations and policies. Fisheries enhancement will focus on naturally occurring species. Implementation should include decisions relating to the identification of specific shorelands for tourism or recreation oriented facility development on a strictly controlled basis, as well as an examination of the complex of proposed and existing protected areas to determine an appropriate mix of conservation reserves and parks (e.g., review of existing provincial nature reserves).



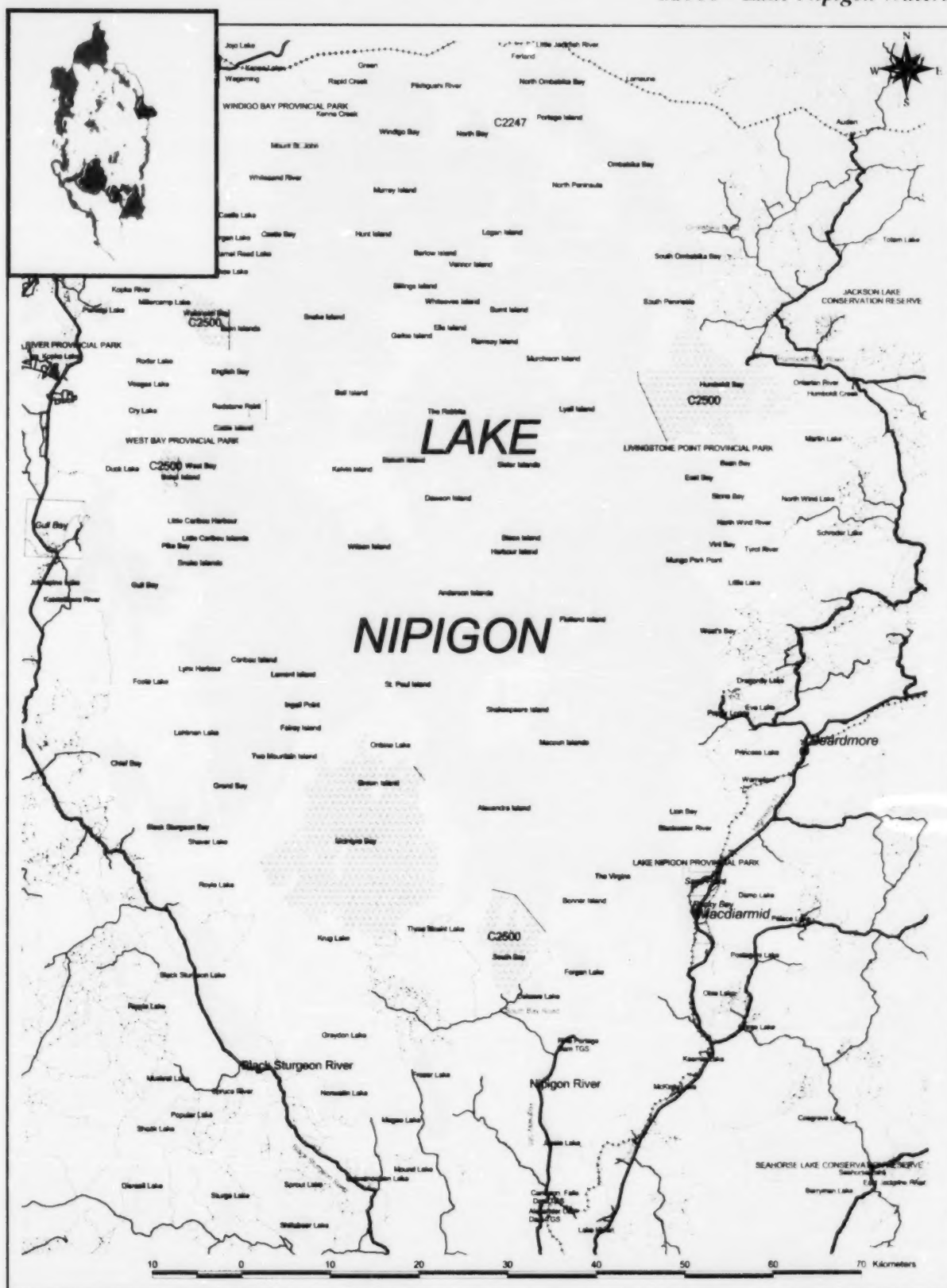
ID: C2500
Name: Lake Nipigon Waters
Area (ha): 48,500
Designation: Conservation Reserve

Area Description:

Portions of 5 bays on Lake Nipigon contain sensitive and representative fisheries habitat, aquatic environments and recreational angling areas. Humboldt Bay, Wabinoash Bay, West Bay, South Bay and McIntyre Bay contain a variety of representative and unique aquatic features, including fisheries habitat, critical spawning areas, wetlands and aquatic vegetation.

Land Use Intent:

Commercial fishing and angling will be managed through existing regulation and will continue to be subject to local planning and management.



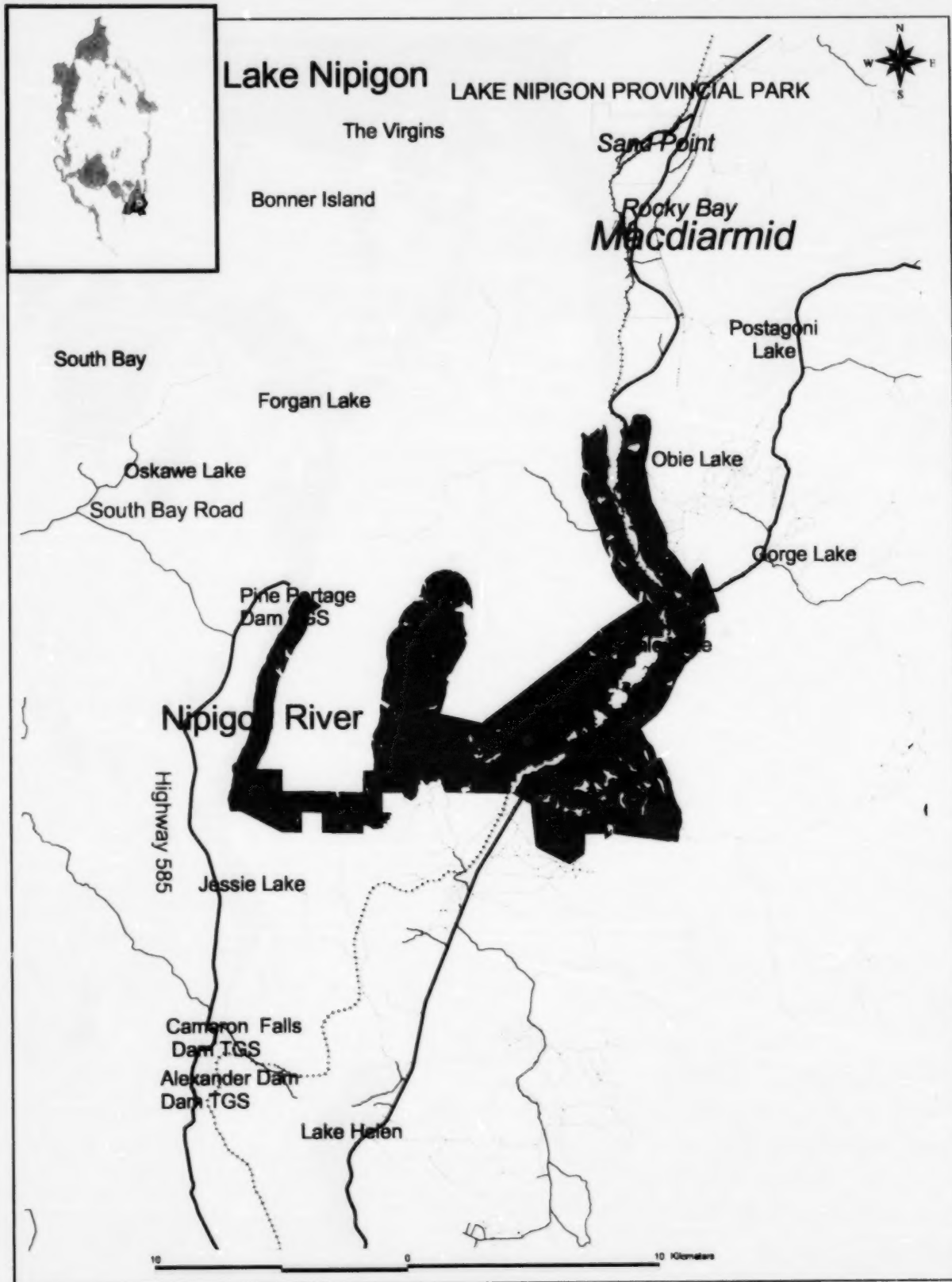
ID: C2238
Name: Nipigon Palisades
Area (ha): 9,556
Designation: Conservation Reserve

Area Description:

This is a prominent geological canyon/ravine feature, which includes a major moose travel corridor (Cash Creek), diabase sill tablelands, well-known scenic geologic features, and microclimates favourable for arctic and rare plant species. A variety of landform and vegetation types are represented here. The area around the Palisades of the Pijitiwabik is a major glacial spillway from prehistoric Lake Kelvin. It is an important tourism and recreational area.

Land Use Intent:

Further work is required to determine exact boundary locations. All private land is excluded from the designation, as well as a number of important aggregate sources. Road access for forestry purposes through the conservation reserve to access forest stands in the Enhanced Management Area to the north is permitted. Optional access corridors will be identified and evaluated through the forest management planning process.



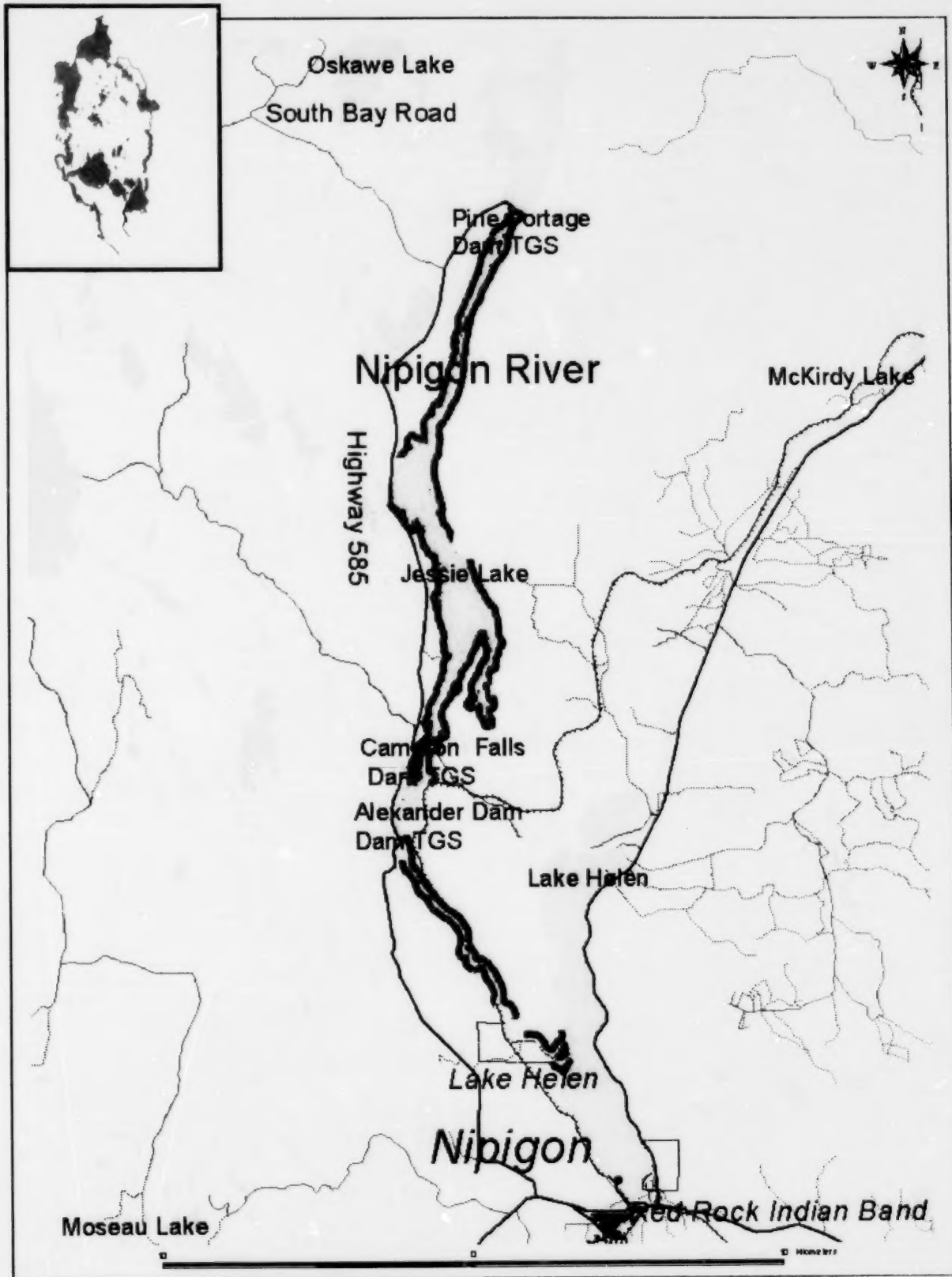
ID: C2383
Name: Nipigon River
Area (ha): 2,533
Designation: Conservation Reserve

Area Description:

The Nipigon River contains an extremely diverse and world-class fishery, eagles, osprey, rare plants, archaeological and historic sites of provincial significance. It is an important recreational waterway, and well developed for hydroelectric generation.

Land Use Intent:

Further design work will be applied to this area to ensure all known values are contained within the boundary. Boundaries will be set at an average of 200 metres from the shoreline. Existing hydro-electric facilities and operations are permitted to continue. Private lands will be excluded.



ID: E2252a
Name: South Lake Nipigon
Area (ha): 35,407
Land Use: Enhanced Management Area
Designation: Remote Access

Area Description:

This area provides an additional buffer along the southern shore of Lake Nipigon to ensure Lake oriented values (e.g., spawning streams, remoteness) are maintained. The area is 2 kilometres in width.

Land Use Intent:

Access and forestry operations within this area should be carefully planned to protect headwater streams flowing into Lake Nipigon. No new permanent access is permitted in this area, except where no other reasonable alternatives exist. Roads will be physically abandoned when no longer required for forestry purposes. The access point at South Bay will remain as a permitted access to the lake. The Orient Bay Peninsula will require longer term forest access which will be closed to public travel. Forestry operations in this area will be planned to minimize the development of access roads in this portion of the EMA.



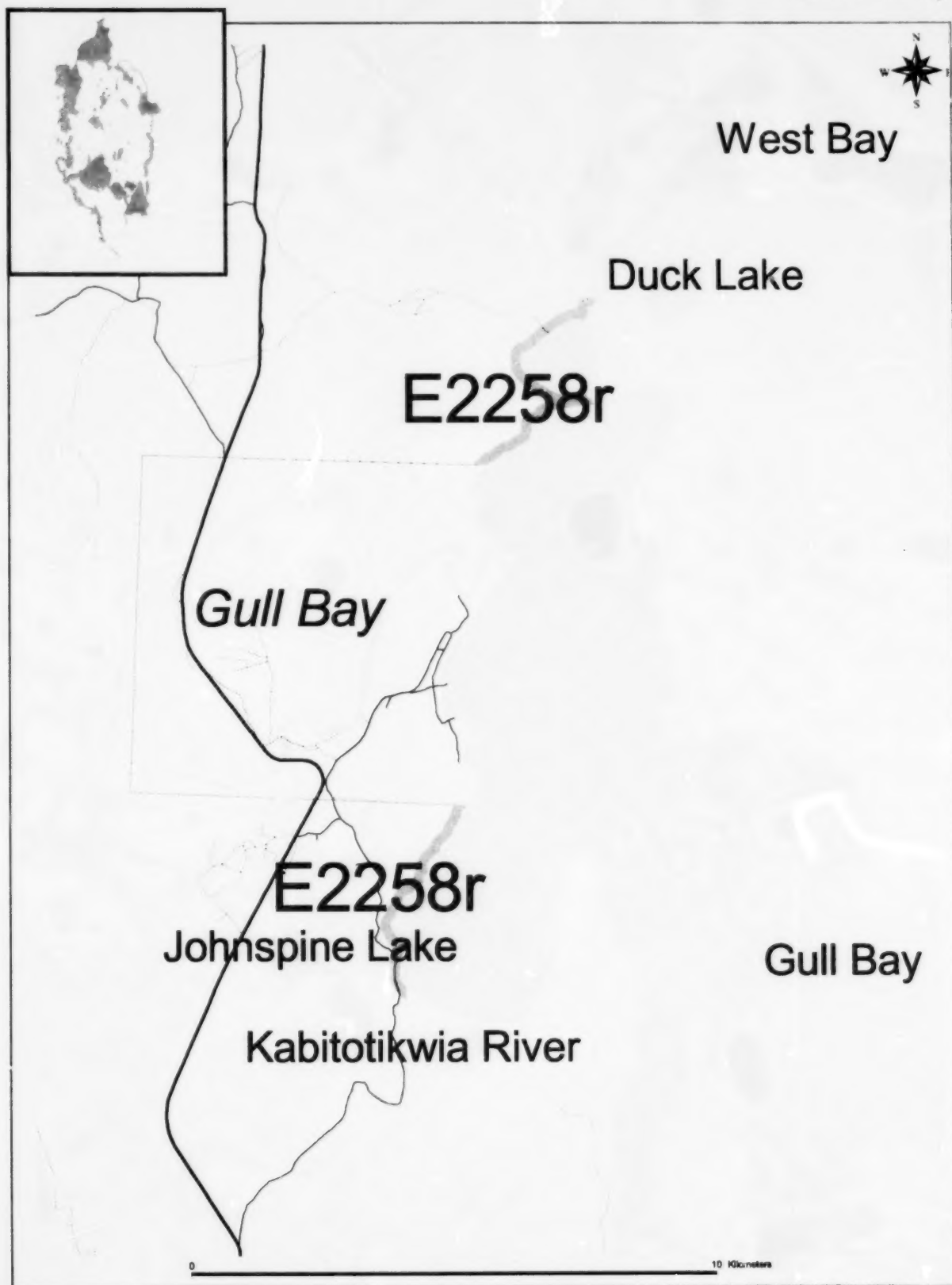
ID: E2258r
Name: Gull Bay
Area (ba): 507
Land Use: Enhanced Management
Area
Designation: Recreation

Area Description:

The area near Gull Bay can provide an access way to the western portion of Lake Nipigon. A 200 metre enhanced management area has been identified to facilitate future shoreline access and development in this area.

Land Use Intent:

This is an important shoreline access area to western Lake Nipigon. There may be potential for future lake oriented development. Shoreline facilities and access to the western portion of Lake Nipigon is encouraged through this area.



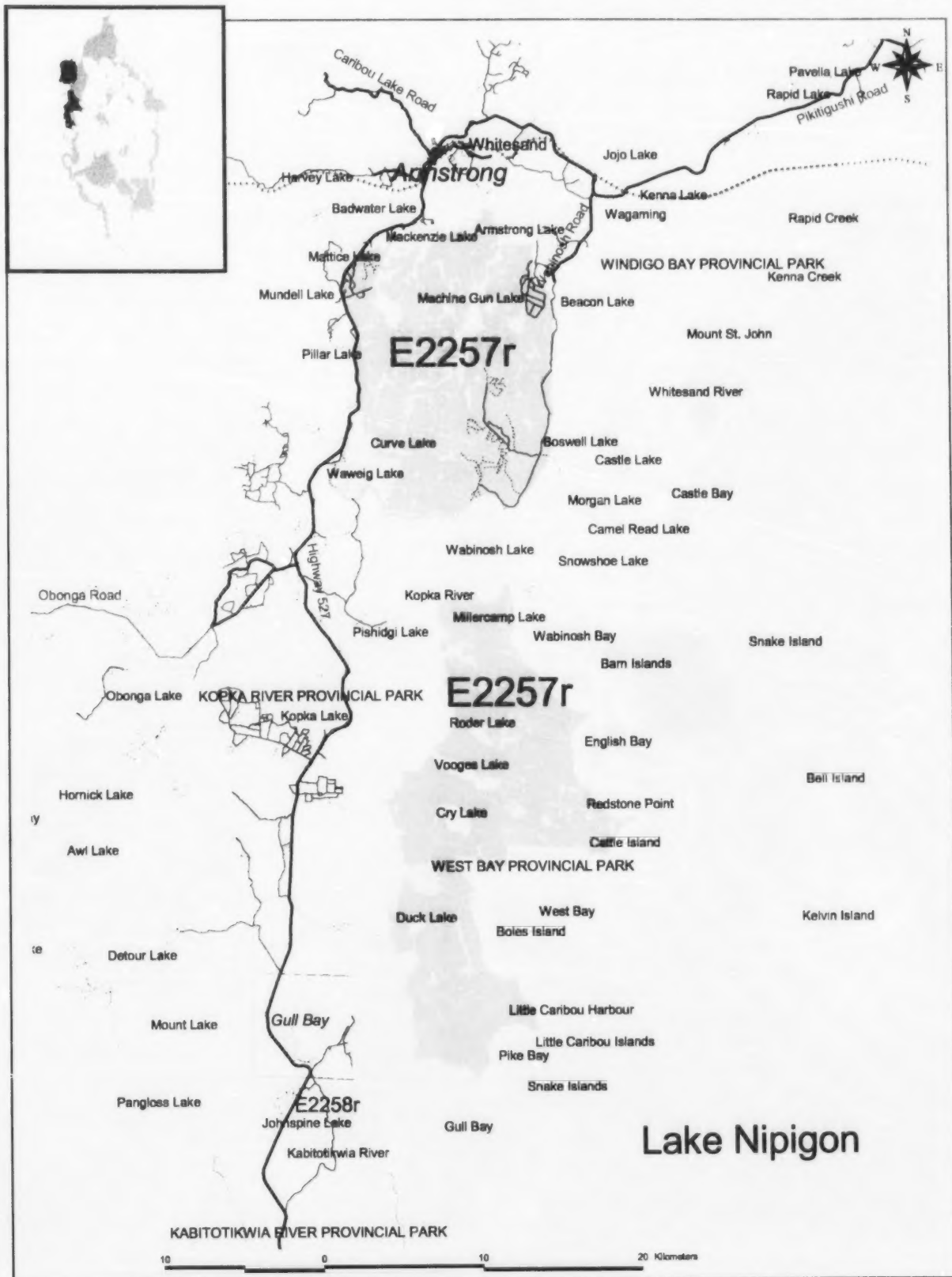
ID: E2257r
Name: West Lake Nipigon
Area (ha): 43,793
Land Use: Enhanced Management
Area
Designation: Recreation

Area Description:

This is a poorly accessed and relatively undeveloped area having excellent potential for future eco-tourism and backcountry recreation. The topography is generally very rugged and is poorly accessed.

Land Use Intent:

The primary intent for this area is to carry out forest management activities in a manner that will facilitate future eco-tourism activities and backcountry recreation. Forest access roads will be kept to a minimum, planned to the lowest class possible, closed to public travel and physically abandoned when no longer required for forestry purposes. Forestry operations should be carried out in a manner that minimizes the number of areas under active operation at any one time.



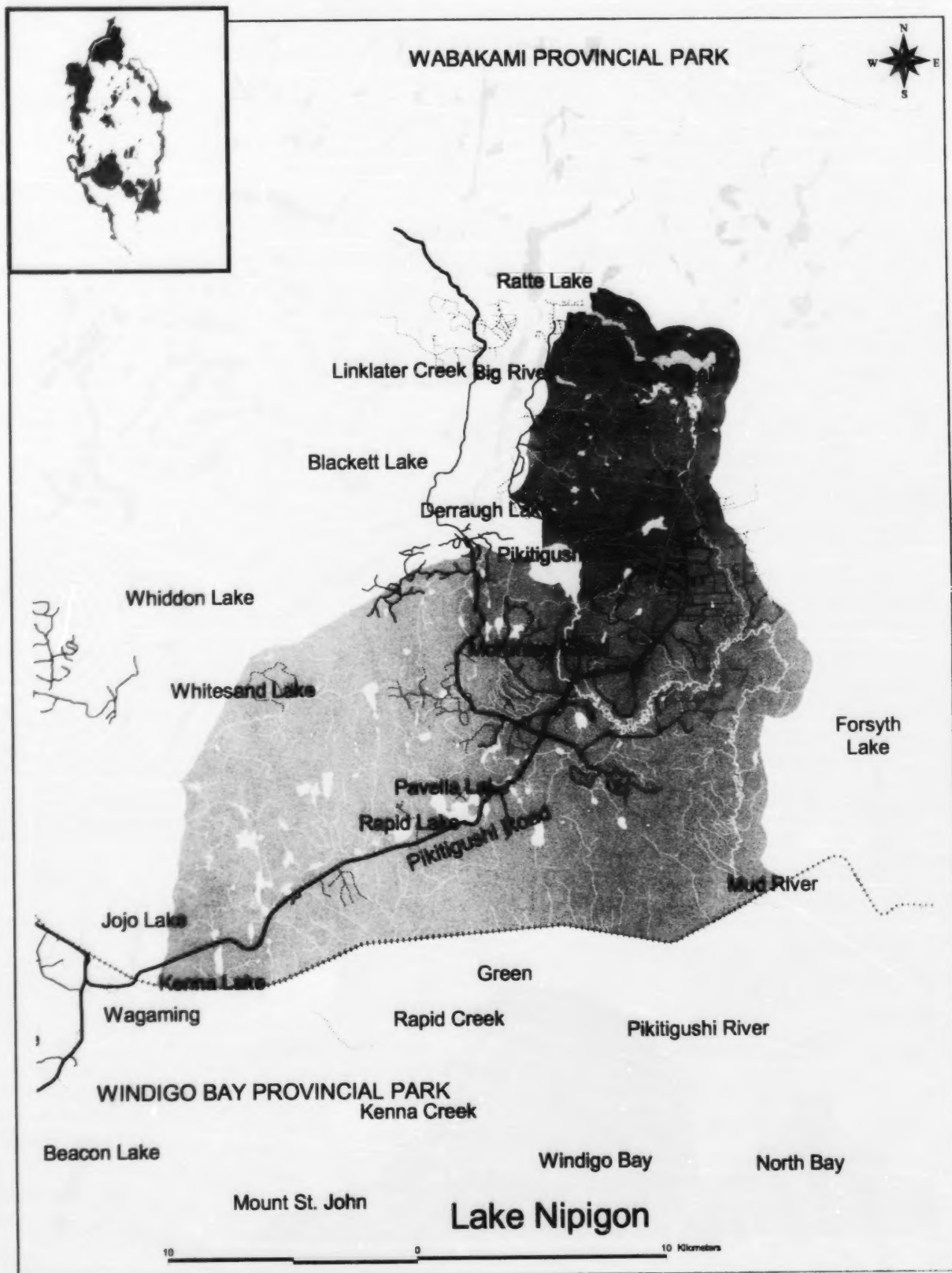
ID: E2251w
Name: Pikitigushi
Area (ha): 40,551
Land Use: Enhanced Management
Area
Designation: Fish and Wildlife

Area Description:

This area provides significant woodland caribou habitat, and ensures a landscape linkage between Wabakimi Park and Lake Nipigon.

Land Use Intent:

Forestry activities will be planned to protect caribou habitat and enhance travel routes from Lake Nipigon to Wabakimi Park in Ogoki Lake area. The extent of existing and future access in the EMA will be examined to determine: where permanent access is required for forestry and transportation; where access is desirable for recreation and tourism activities (e.g., hunting and angling); and when further access development should be limited, and existing roads should be removed or allowed to naturally deteriorate to address caribou habitat concerns. Management activities and prescriptions will consider landscape and ecological linkages, and in particular the need to maintain a linked network of mature forest tracts between Lake Nipigon and Wabikimi Park.



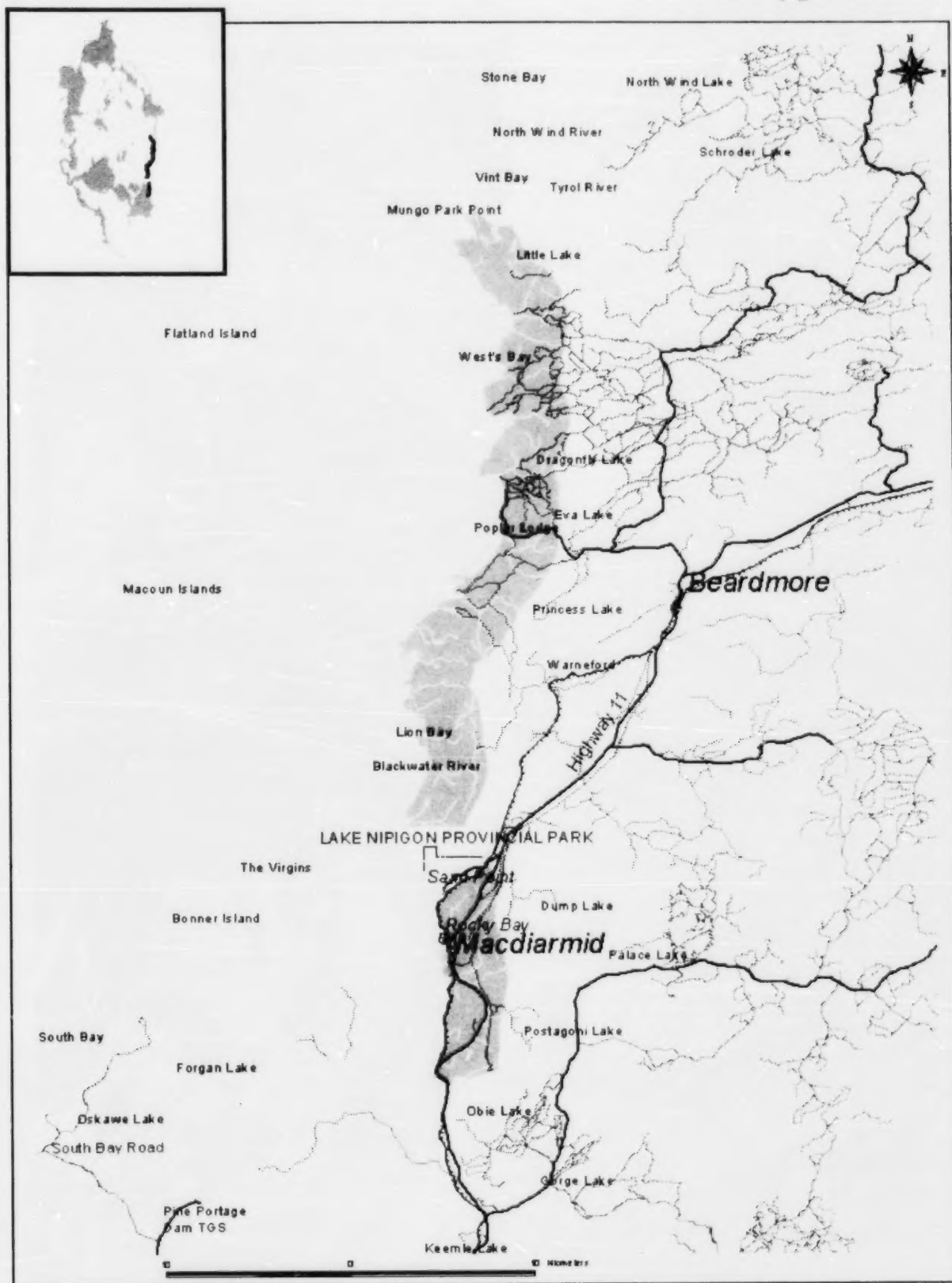
ID: E2237r
Name: Lake Nipigon - Beardmore
Area (ha): 15,414
Land Use: Enhanced Management
Area
Designation: Recreation

Area Description:

An area from the southern end of Pijitiwabik Bay to Mungo Park Point some 3 kilometres in width has been identified to facilitate planned development along the eastern shoreline of Lake Nipigon. The area has high recreational use and high mineral potential and is an important shoreline access area to southern Lake Nipigon.

Land Use Intent:

This is an important shoreline access area to southern Lake Nipigon. Future lake oriented development (e.g., tourism, cottaging) is encouraged, subject to careful planning that takes into account the recreational and natural values of the area. New public access to the lake should also be carefully planned, in order to preserve the remote recreational values along portions of this shoreline. Within 300 metres of Lake Nipigon, forestry operations must be carried out in a manner which is sensitive to the recreational, tourism and scenic values of the



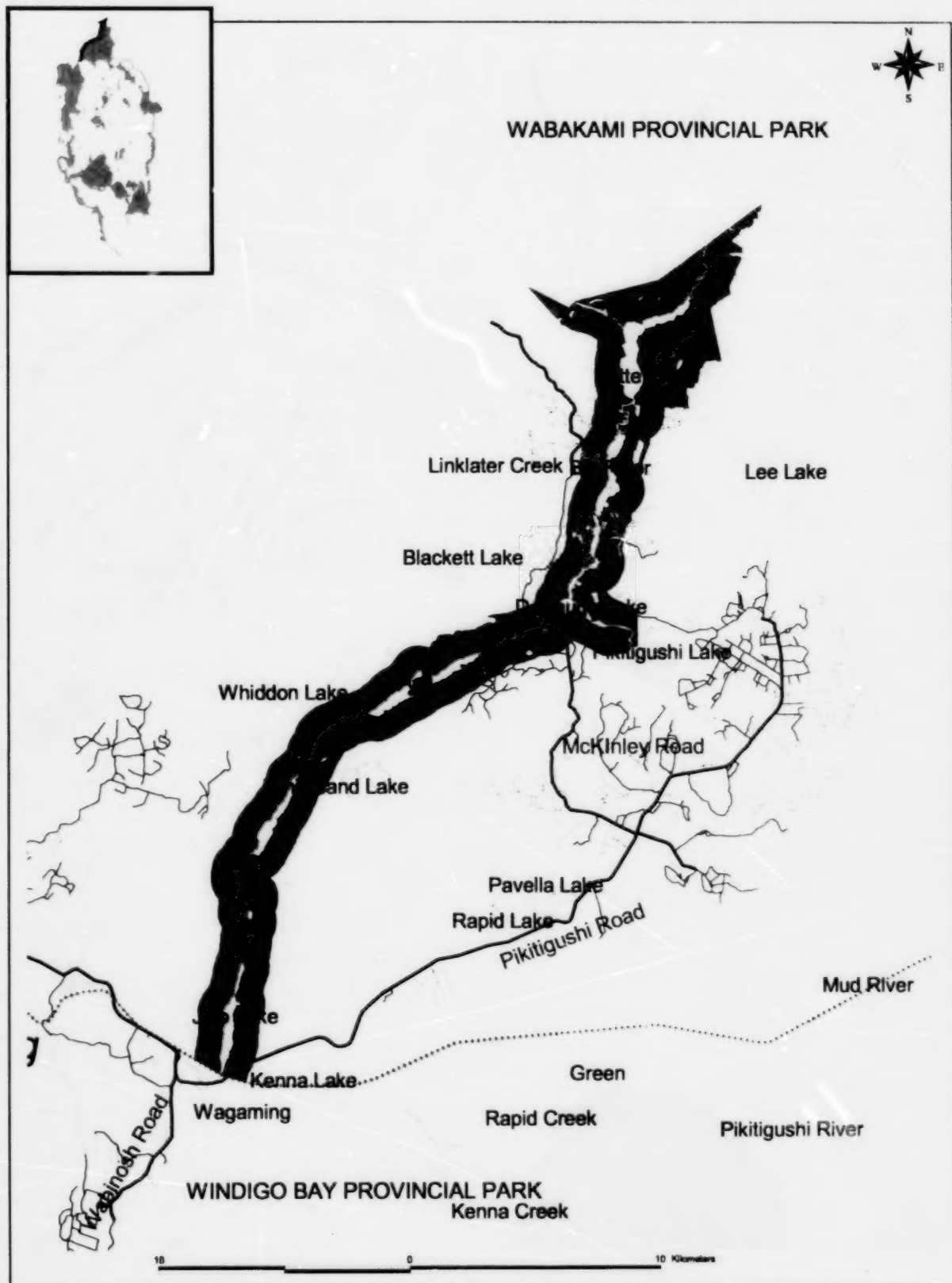
ID: P2253
Name: Whitesand Provincial Park
Area (ha): 12,506
Land Use: Provincial Park
Designation: Waterway

Area Description:

The Whitesand River is an important wildlife travel corridor between Lake Nipigon and Wabakimi Provincial Park. The site also contains a number of historic sites and representative landscape features, including mixed forest types on weakly broken ground and end moraine.

Land Use Intent:

Boundaries are established at 1 km from the shoreline. Road crossings of the park will be permitted for forest management purposes, but will be kept to a minimum.



ID: P2256
Name: Kopka River Park Addition
Area (ba): 3,879
Land Use: Provincial Park Addition
Designation: Waterway

Area Description:

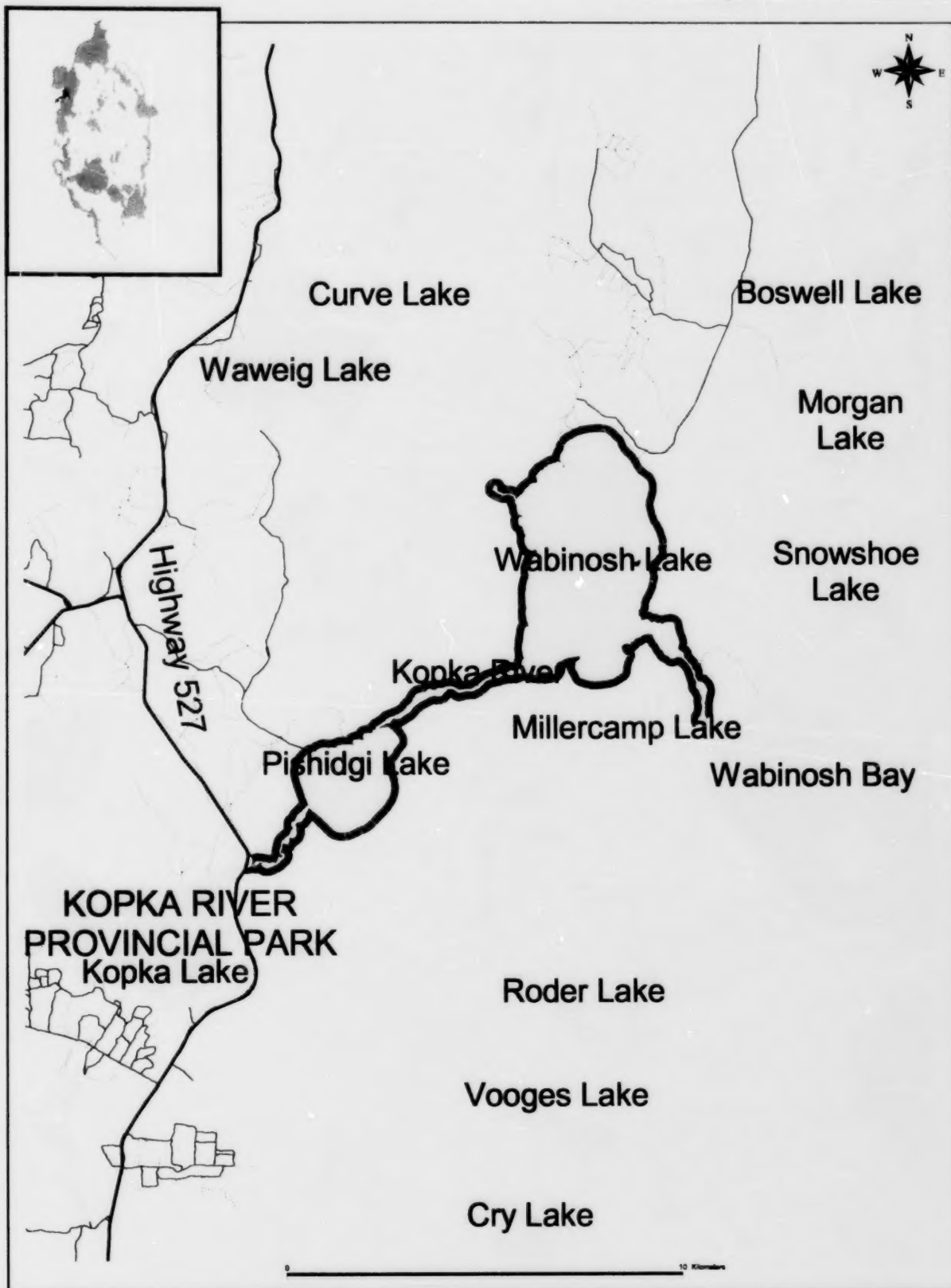
This includes 2 separate additions to the Kopka River waterway park.

The first addition includes Wabinosh Lake and provides a waterway linkage along the Wabinosh River from Lake Nipigon to Obonga Lake. Wabinosh Lake is an important recreational and tourism area.

The second is a small addition that adds a landlocked area to the park and adds to park variety.

Land Use Intent:

Boundaries are established at 200 metres from the shoreline of the river and lake for the Wabinosh portion of this addition.



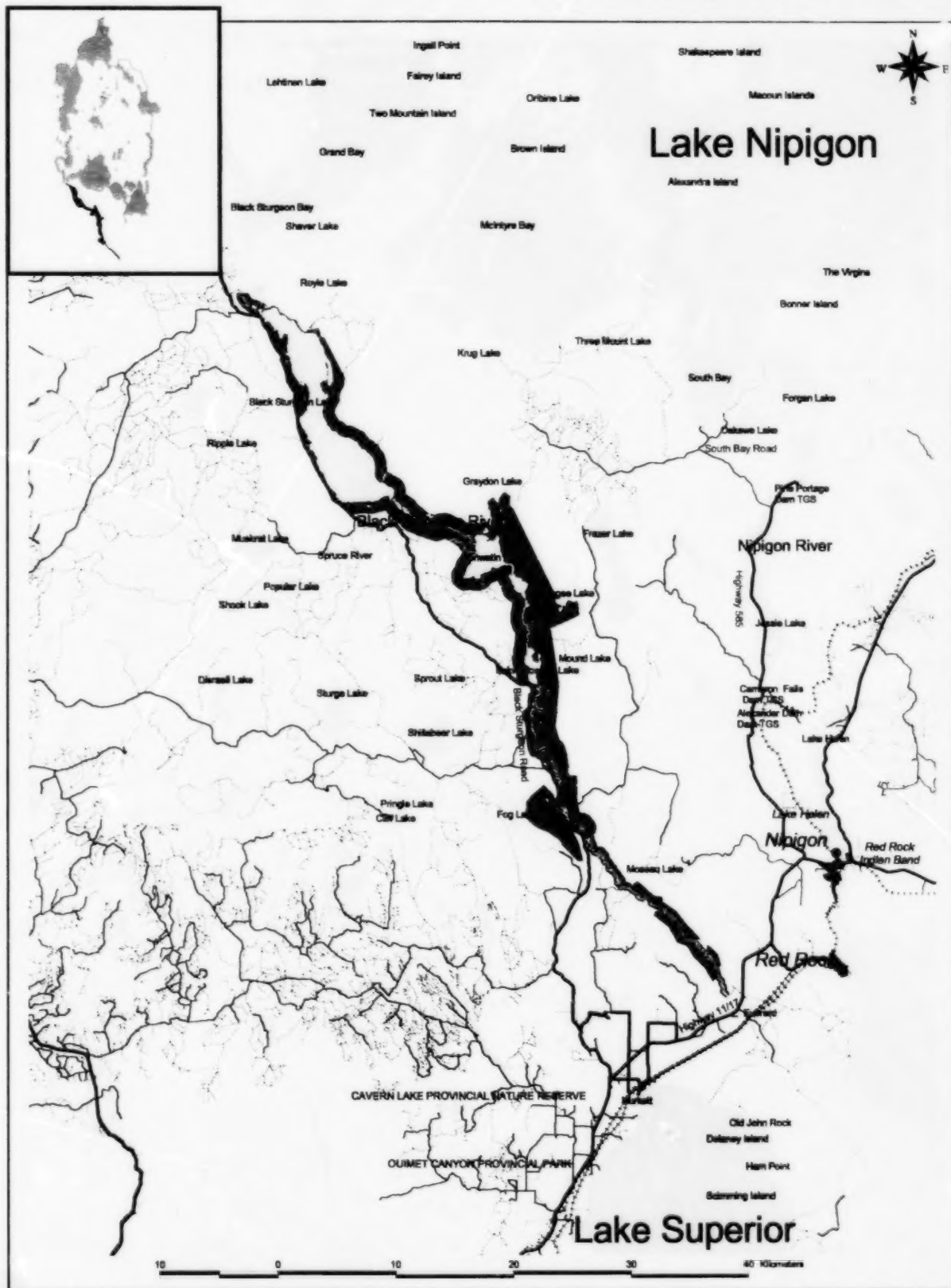
ID: P2250
Name: Black Sturgeon River
Provincial Park
Area (ha): 22,849
Land Use: Provincial Park
Designation: Waterway

Area Description:

This is an important recreational waterway for angling, hunting and canoeing. There are diverse fisheries and landscape features (e.g. glacial spillway, cuestas) with rugged terrain. Easily accessed.

Land Use Intent:

Existing road corridors passing through the park will be permitted to remain for forest management purposes. Existing back-country and rock climbing activities associated with the Outward Bound Wilderness School may continue in this area.



Appendix B: Preliminary Objectives

Aboriginal Objectives:

- to ensure that Aboriginal and Treaty rights, as identified under the Canadian Constitution, are recognized and respected throughout the planning process;
- to ensure local Aboriginal Communities benefit from economic opportunities generated through the planning and management of the Lake Nipigon Basin;
- to encourage active involvement by the communities of Red Rock, Biinjitiwaabik Zaaging Anishinaabek, Gull Bay, Lake Nipigon Ojibway, Sand Point, Poplar Point, Poplar Lodge and White Sands throughout the planning process.

Access Objectives:

- to maintain the remote and inaccessible character of the northern half of the Basin;
- to recognize the Basin's scenic, ecological and land use values when considering the establishment of any access roads to existing or new development;
- to direct planned access for tourism/recreation opportunities to the identified recreational enhanced management Areas (E2237r, E2258c, E2257r) in the Basin and to ensure road development is controlled and compatible with the ecological and resource sustainability objectives for the Basin;
- to review current access points and roads to determine whether they should be removed, improved or left status quo.

Crown Land Use Objectives:

- to develop guidelines for the use of Crown land within the Basin for example, camping, land use permits, trail use;
- to encourage low impact camping.

Cultural Heritage Objectives:

- to identify, document and protect the cultural and historical values of the Lake Nipigon Basin;
- to encourage the development and promotion of facilities/initiatives/partnerships that further the conservation, interpretation and understanding of the Lake Nipigon Basin's cultural heritage.

Fisheries Objectives:

- to protect, rehabilitate and sustain aquatic ecosystems and populations within the Basin, while allowing for the benefits of Aboriginal subsistence, sport, commercial and bait fishing;
- to protect and rehabilitate fish habitat (eg: spawning beds, upwellings, nursery areas) to ensure sustainability of healthy fish communities;
- to manage for a sustainable, world class commercial and sport fishery. Examples of strategies include a direct harvest control system, improving information and knowledge of lake contours, upwelling areas, benthos, water quality etc.;
- to foster partnerships with Aboriginal and non-Aboriginal communities, Ontario Power Generation and interest groups for the achievement of fisheries habitat management, data collection and public education.

Forestry Objectives:

- to manage forestry within the enhanced management areas to ensure there is no reduction in normal wood supply;
- to develop detailed, specific forestry practices for the five, enhanced management areas, to protect identified esthetic, recreational and ecological values and adjacent protected areas.

Mining Objectives:

- to modify mineral exploration and development within the five, enhanced management areas to protect identified esthetic, recreational and ecological values and adjacent protected areas.

Provincial Parks, Conservation Reserves & Enhanced Management Areas Objectives:

- to review existing parks within the Lake Nipigon Basin in terms of their classification and boundaries to ensure Ontario Parks objectives are being met;
- to plan for new and existing provincial parks, conservation reserves and enhanced management areas (EMAs) within the context of the overall comprehensive land use decision making process such that specific park plans, statements of conservation interest and EMA strategies will form part of the final strategy document as chapters or appendices;
- to ensure that decisions regarding permitted uses/development/activities in existing and new provincial parks, conservation reserves, and EMAs comply with the Land Use Strategy and current park policy;
- to develop guidelines for the protection and management of water quality, vegetation, animal populations and habitat in the Lake Nipigon Waters conservation reserve (C2500).

Tourism /Recreation Objectives:

- to consider the development of new tourism and recreation opportunities in the southern portion of the Basin;
- to ensure any tourism/recreation development and activities will occur such that the capacity of the supporting natural resource base is not exceeded, for example, emphasizing non-consumptive tourism and recreation opportunities;
- to investigate the potential for new cottage development, on an environmentally suitable site within the Lake Nipigon -Beardmore EMA.

Vegetation Objectives:

- to determine, using local knowledge, science and modeling tools, the appropriate means to maintain a natural variety of vegetation cover (eg: diversity of age class, forest type, habitat type);
- to identify and protect rare and disjunct plant species.

Wildlife Objectives:

- to protect and sustain wildlife habitat and populations within the Basin while allowing for the benefits of wildlife viewing, hunting, trapping, etc.;
- to review hunting in the Basin for example, hunting versus no hunting zones and primitive weapon versus modern weapon hunts;
- to promote opportunities for non-consumptive uses of wildlife (nature appreciation, interpretation, education, scientific study etc);
- to assist in preventing additional species from becoming endangered or threatened in Ontario while actively improving, where applicable, the status of existing endangered or threatened species for example, woodland caribou, white pelican and peregrine falcon;

- to protect, rehabilitate and create wildlife habitat to achieve sustainable and diverse wildlife populations and to ensure environmental quality and ecosystem integrity;
- to promote partnerships with Aboriginal and non-Aboriginal communities, and interest groups for the achievement of wildlife habitat management, data collection and public education.

Water Quality Objectives:

- to improve water quality and ensure that no degradation of water quality occurs as a result of tourism, recreational or industrial development in the Basin,

Water Quantity Objectives:

- to ensure that the Water Management Plan for Lake Nipigon and the Nipigon River are adhered to and improved whenever possible,
- to ensure that water management on the Nipigon watershed is conducted in concert with water management for the Great Lakes.

Glossary

Aggregate – Mixed mineral matter composed of sands and gravel. These particles cohere in such a way that they behave mechanically as a unit.

Arctic – The ecological zone north of the latitudinal tree line, characterized by a distinct climate and vegetation.

Basalt – A dark gray to black dense to fine-grained igneous rock that consists of basic plagioclase, augite, and usually magnetite.

Bedrock – The solid rock underlying soil or exposed at the surface.

Benthos – Organisms that live on or in the bottom of a body of water.

Biodiversity – Totality of the richness of biological variation, ranging from within species genetic variation, through subspecies and species, to communities, and the pattern and dynamics of these on the landscape.

Bog – Peatland that obtains nutrients solely (or primarily) from precipitation and are generally unaffected by nutrient-rich groundwater. These areas are acidic and often dominated by heath shrubs and *Sphagnum* mosses and may include open-growing, stunted trees.

Boreal – A climatic and ecological zone that occurs south of the subarctic, but north of the temperate hardwood forests of eastern North America.

Climate – The accumulated long-term effects of weather that involve a variety of heat and moisture exchange processes between the earth and the atmosphere.

Conservation Reserve – Lands regulated under the Public Lands Act for the purposes of protecting natural heritage areas and natural features on public land and preserving traditional public land uses including wildlife viewing, hunting, fishing, walking, snowshoeing, cross country skiing and boating. Commercial forestry, mining, hydro development, aggregate and peat extraction are non-permitted uses.

Corridor – In a landscape, a narrow strip of land that differs from the matrix on either side. Corridors may be isolated strips, but are generally attached to a patch of somewhat similar vegetation.

DDT – (dichlorodiphenoltrichloroethane) A colorless, odorless, water-insoluble crystalline insecticide $C_{14}H_9Cl_5$ that tends to accumulate in ecosystems and has toxic effects on many vertebrates.

Delta – Alluvial deposits at the mouth of a river, usually triangular in outline with low relief.

Diabase – A hill or ridge with a steep face on one side and a gentle slope on the other

Drumlin – A smooth, elongated hill created by flowing glacial ice. The long axis and tapered ends are oriented in the direction of glacial ice flow.

Eco-tourism – The practice of touring natural habitats in such a way as to minimize ecological impact.

Ecosystem – A complex interacting system that includes all plants, animals and their environment within a particular area.

Endangered – Any indigenous species of flora or fauna whose existence in Canada is at risk of immediate extinction throughout all or a significant portion of its range due to the actions of humans.

Enhanced Management Area (EMA) – A new land use designation that provides more detail land use category in areas of special features or values. A wide variety of resources and recreational uses can occur in EMAs. Modifications (e.g. timing, location, method, access) in resource management practices may be needed in order to recognize other land values.

Erosion – The degradation of a surface by chemical and mechanical weathering and the removal of materials by wind or water.

Erratic – A rock fragment that has been carried over a great distance, generally by glacial ice or floating ice, and that differs from the bedrock on which it rests.

Esker – A linear to meandering ridge consisting of sorted sand and gravel deposits created by water flowing beneath a glacier.

Fault – A break in bedrock along which movement has occurred or could occur

Fauna – A general term for animal life, especially the animals characteristic of a region, period, or special environment.

Fen – A wetland with a peat substrate, nutrient-rich waters, and primarily vegetated by shrubs and graminoids (grass-like vegetation).

Flora – A general term for plants characteristic of a region, period, or special environment.

Genetics – The study of the patterns of inheritance of specific traits.

Geology – The study of the history of the earth and its life as recorded in rocks.

Geomorphology – The study of the physical features of the earth's surface and their relation to its geological structures

Glacier – A mass of ice that develops as a result of snow and ice accumulation over a long-period of time and that moves laterally from the center of accumulation

Habitat – The sum of environmental circumstances in the place in which an organism (plant or animal), population, or community lives.

Hydrology – The science dealing with the properties, distribution, and circulation of water on and below the earth's surface, and in the atmosphere.

Lacustrine – The sediments on freshwater lakebeds that generally consist of stratified fine sand, silt, and clay deposits.

Landscape – A heterogeneous land area composed of a cluster of interacting ecosystems that are repeated in similar form throughout. Landscapes can vary in size, down to a few kilometers in diameter.

Limnology – The physical, biological and chemical study of all inland waters, including lakes, streams, springs, puddles, ponds, etc.

Mafic Rock – Relating to, or being a group of usually dark-colored minerals rich in magnesium and iron.

Marsb – A wetland with a mineral or peat substrate inundated by nutrient rich water and characterized by emergent graminoid (grass-like) vegetation.

Mesas – An isolated, relatively flat-topped, natural elevation usually more extensive than a butte and less extensive than a plateau.

Microclimate – Localized climatic conditions ranging down to conditions at the stand or even individual plant environmental level.

Moraine – A mount, ridge, or other distinct accumulation of generally unsorted, unstratified glacial drift, predominantly till, and deposited chiefly by the direct action of glacier ice.

Old Growth Forest – A stand of mature or over mature trees relatively uninfluenced by human activity.

Oligotrophic – A condition of low nutrient status and acidic.

PCB – (polychlorinated biphenyl) Any of several compounds that are produced by replacing hydrogen atoms in biphenyl with chlorine, have various industrial applications, and are poisonous environmental pollutants which tend to accumulate in animal tissues.

Plankton – The passively floating or weakly swimming, minute animal and plant life of a body of water

pH – The measure of acidity or alkalinity of a solution, based on hydrogen ion concentration. The logarithmic scale ranges from 0 (maximum acidity) to 14 (maximum alkalinity, with the middle, 7, representing the neutral point.

Rare species – Any indigenous species of fauna or flora that because of its biological characteristics or because it occurs at the fringe of its range, or for some other reasons, exists in low numbers or in very restricted areas of Canada, but is not a threatened species.

Sedimentary Rock – A rock formed from materials deposited from suspension or precipitated from solution and usually more or less consolidated.

Species – A group of organisms having a common ancestry that are able to reproduce only among themselves.

Succession – The progression within a community whereby one plant species replaces another until a stable assemblage for a particular environment is attained. Primary succession occurs on newly created surfaces, while secondary succession involves the development or replacement of one stable successional species by another on a site having a developed soil. Secondary succession occurs on a site following a disturbance (fire, harvesting) in existing communities.

Sustainable Forest License (SFL) – A form of tenure whereby forest companies hold licenses to operate forest management units. Planning is accomplished through the use of forest management plans for twenty-year periods to be renewed every five years.

Talus – A collection of fallen, disintegrated material that has formed a pile at the foot of a steep slope.

Taxonomy – A system of species classification according to shared attributes.

Threatened – Any indigenous species of flora or fauna that is likely to become endangered in Canada if the factors affecting its vulnerability are not reversed.

Topography – The physical features of an area such as land shape and relief.

Ubiquitous – Pertaining to a species capable of living in many different ecological conditions.

Wetland – Land that is saturated with water long enough to promote hydric soils or aquatic processes as indicated by poorly drained soils, hydrophytic vegetation, and various kinds of biological activity that are adapted to wet environments.

References

- Adams, J. Personal communication, Commerical Fishermen and resident of MacDiarmid
- Armstrong, Ted. 2001. Personal communication, Northwest Regional Wildlife Biologist. OMNR.
- Atria. 1993. Nipigon River: Development of a Water Management Plan, Draft Options Report. North Shore of Lake Superior Remedial Action Plans Technical Report #18. 123 pp.
- B.A.R. 1995. Monitoring of Fish Habitat enhancements and invertebrate drift in the Nipigon River two years after pipeline construction. October 1994. Report prepared for Trans Canada Pipelines, Calgary, Alberta by B.A.R. Environmental Inc. Guelph, Ontario. March 1995. 25 pp.
- Banfield, A.W.F. 1977. The Mammals of Canada. National Museum of Natural Sciences, University of Toronto Press, Canada. 438 pp.
- Behnke, R. 1994. Coaster brook trout and evolutionary "significance". Trout. The Journal of Coldwater Fisheries Conservation. Autumn 1994. P. 59-60.
- Bergerud, A.T. 1974. The decline of caribou in North America following settlement. J. Wildlife Management. 38:757-770.
- Bird and Hale Ltd. 1994. Lake Nipigon area earth and life science and cultural features evaluation report. Toronto, Ontario. 127 pp.
- Bluth, P. 2001a. Lake Nipigon Basin Shoreline Landscape Development Constraints and Capabilities. Ontario Ministry of Natural Resources, Nipigon District. Unpublished
- Bluth, P. 2001b. A brief summary of the pre-history and history of the Lake Nipigon Basin. Ontario Ministry of Natural Resources, Nipigon District. Unpublished.
- Bryan, S. 1991. Pelicans nesting on Lake Nipigon. Ontario Birds. 9(3):58-63.
- Burt, William Henry and R. P. Grossenheider. A field guide to the Mammals: Field marks of all North American species found north of Mexico. Peterson Field Guide Series; 5 Boston: Houghton Mifflin, XXV, 289 P., (28) Leaves of Plates: ILL.; 19 CM. 1976. 3D ED. Canadian Broadcasting Corporation Web Site, 2001. *Canada, A People's History, The Pathfinders*. Based on Script for Episode 6 by Hedersen, Gordon and Book by Gillmor, Don & Turgeon, Pierre. McClelland & Stewart, Toronto, Ontario.
- Carroll, Sarah. 2000. Personal communications. Resident of Orient Bay.
- Carroll, Tim. 1993 & 2001. Personal communications. Owner/Captain Nighthawk Charters and Resident of Orient Bay.
- Chapman, L.J., M.K. Thomas, 1968. The Climate of Northern Ontario. Dept. of Transport, Meteorological Br., 58 p.
- Chessell, R. 1981. Invertebrates Sampling, Nipigon River. Unpublished. Nipigon District Files.
- City of Edmonton, 1995 - 2001, Information Web Page
- Cooper, Martin S. 2000. *An Overview of the Prehistory and Early History of the Southern Canadian Shield Region*, Archaeological Services Incorporated, North Bay, Ontario.
- Cringan, A.T. 1957. History, food habits and range requirements of the woodland caribou of continental North America. Pages 481-501 in Trans. North American Wildlife Conference 22.
- Cumming, H., and D.B. Beange. 1987. Dispersion and movement of woodland caribou in Ontario near Lake Nipigon, Ontario. Journal of Wildlife Management 51(1):69-79.
- Dawson, K.C.A. 1969. A report on Lake Nipigon Fur Trading Posts. Toronto: Ontario Archaeological and Historic Sites Board.

- Dawson, K.C.A. 1976. Algonkians of Lake Nipigon: An Archaeological Survey. National Museum of Man Mercury Series. Archaeological Survey of Canada, Paper No. 48.
- Dawson, Niel. 2001. Wolverine report. Ontario Ministry of Natural Resources. Northwest Science and Technology Unit. Thunder Bay, Ontario. Unpublished.
- De Vos, A.D. and A.L. Peterson. 1951. A review of the status of woodland caribou (*R. caribou*) in Ontario. J. Mamm. 32:329 - 338.
- Dewdney, S. and Kidd, K. 1973. *Indian Rock Paintings of the Great Lakes*. University of Toronto Press, Toronto, Ontario.
- Drost, A. 2001. Synopsis of Geology, Metallogeny and Mineral Potential Nipigon Basin Signature Site. Unpublished.
- Dupuis, R. Personal communications. Trapper.
- Dymond, J.R. 1926. The Fishes of Lake Nipigon. University of Toronto Studies: Biology Series, Pub. Ont. Fisheries Research Lab., No. 27.
- Dymond, J.R., L.L. Snyder and E.B.B. Logier. 1928. A Faunal Survey of the Lake Nipigon Region, Ontario. A contribution of the Royal Ontario Museum of Zoology. Reprinted from Transactions of the Royal Canadian Institute, Vol. XVI, Part 2. Pp. 233-291.
- Environment Canada. 1997. Canadian Hydrological Data. Water Resources Branch. Ottawa.
- Environment Canada. 1994. The fall and rise of osprey populations in the Great Lakes Basin. Great Lakes Fact Sheet ISBN 0-662-21566-4.
- Environment Canada. 2001. Species at Risk in Canada. World Wide Web http://www.speciesatrisk.gc.ca/species/english/search_request.cfm.
- Escott, N.G. and S. Bryan. 1993. Some Notes on the Breeding Birds of Lake Nipigon, Thunder Bay District, Ontario. Ontario Birds 11(3):91-97.
- Escott, Nick. 1995. Attachment to Thunder Bay Field Naturalist letter to Ron Running, OMNR, District Manager Nipigon, commenting on apparent inaccuracies in Bird & Hale 1994. Nipigon District files.
- Escott, Nick. 2001. Personal communications. Thunder Bay Field Naturalist.
- Evans, R.M. 1984. Development of thermoregulation in young white pelicans. Canadian Journal of Zoology. 62:808-813
- Gollat, R.L. 1975. A preliminary investigation into the fish and wildlife values of the islands of Lake Nipigon. Ontario Ministry of Natural Resources. Unpublished. Nipigon District.
- Gollat, R.L. 1976. A Preliminary Investigation Into the Fish and Wildlife Values of the Islands of Lake Nipigon. Ontario Ministry of Natural Resources.
- Griffin, James and Quimby, George, "The McCollum Site, Nipigon District Ontario" in Toronto Press, Toronto, Ontario.
- Drost, A. 2001. Synopsis of Geology, Metallogeny and Mineral Potential Nipigon Basin Signature Site. Unpublished.
- Dupuis, R. Personal communications. Trapper.
- Dymond, J.R. 1926. The Fishes of Lake Nipigon. University of Toronto Studies: Biology Series, Pub. Ont. Fisheries Research Lab., No. 27.
- Dymond, J.R., L.L. Snyder and E.B.B. Logier. 1928. A Faunal Survey of the Lake Nipigon Region, Ontario. A contribution of the Royal Ontario Museum of Zoology. Reprinted from Transactions of the Royal Canadian Institute, Vol. XVI, Part 2. Pp. 233-291.
- Environment Canada. 1997. Canadian Hydrological Data. Water Resources Branch. Ottawa.
- Environment Canada. 1994. The fall and rise of osprey populations in the Great Lakes Basin. Great Lakes Fact Sheet ISBN 0-662-21566-4.
- Environment Canada. 2001. Species at Risk in Canada. World Wide Web http://www.speciesatrisk.gc.ca/species/english/search_request.cfm.

- Escott, N.G. and S. Bryan. 1993. Some Notes on the Breeding Birds of Lake Nipigon, Thunder Bay District, Ontario. *Ontario Birds* 11(3):91-97.
- Escott, Nick. 1995. Attachment to Thunder Bay Field Naturalist letter to Ron Running, OMNR, District Manager Nipigon, commenting on apparent inaccuracies in Bird & Hale 1994. Nipigon District files.
- Escott, Nick. 2001. Personal communications. Thunder Bay Field Naturalist.
- Evans, R.M. 1984. Development of thermoregulation in young white pelicans. *Canadian Journal of Zoology*. 62:808-813
- Gollat, R.L. 1975. A preliminary investigation into the fish and wildlife values of the islands of Lake Nipigon. Ontario Ministry of Natural Resources. Unpublished. Nipigon District.
- Gollat, R.L. 1976. A Preliminary Investigation Into the Fish and Wildlife Values of the Islands of Lake Nipigon. Ontario Ministry of Natural Resources.
- Griffin, James and Quimby, George, "The McCollum Site, Nipigon District Ontario" in "Miscellaneous Studies of Great Lakes Prehistory," University of Michigan, 1961.
- Herdendorf, C.E. Large lakes of the world. *Journal of Great Lakes Research* (Ann Arbor); Vol.8(3) pp 379 - 412, 1982
- Hills, G.A. 1959. A Ready Reference to the description of the Land of Ontario and its Productivity. Preliminary report, Ontario Department of Lands and Forests.
- Holmes, A.M., Q.F. Hess, R.R. Tasker, and A.J. Hanks. 1991. The Ontario Butterfly Atlas. Toronto Entomologists Association.
- Holmes, G.L. 1976. The Impact of the Ogoki Diversion on The Little Jackfish River and Ombabika Bay with Special Emphasis on the Walleye and Sauger. Ontario Ministry of Natural Resources. Unpublished report. 111 pp plus appendices.
- Houston, J.J. 1988. Status of the Shortjaw Cisco, (*Coregonus zenithicus*) in Canada. *Canadian Field - Naturalist*. 102(1): 97-102.
- Hydro-Electric Power Commission of Ontario. 1927. The 19th annual report of the HEPC.
- Hydro-Electric Power Commission of Ontario. 1931. The 20th annual report of the HEPC.
- Hydro-Electric Power Commission of Ontario. 1941. The 32nd annual report of the HEPC.
- Hydro-Electric Power Commission of Ontario. 1942. The 34th annual report of the HEPC.
- Hydro-Electric Power Commission of Ontario. 1943. The 35th annual report of the HEPC.
- Hyer, B.T. 1997. Effects of roads and log hauling on woodland caribou use of a traditional wintering area near Armstrong, Ontario. Graduate Thesis, Faculty of Forestry, Lakehead University. 103pp
- Karas, N. 1997. Brook Trout, A Thorough Look at North America's Great Native Trout - Its History, Biology and Angling Possibilities. The Lyons Press. New York. 371 pp.
- Keir, Michael, pers. comm. 2001. Department of Fisheries and Oceans. Burlington, Ontario.
- Kelso, J.R. and Demers, J.W. 1993. *Our Living Heritage - the Glory of the Nipigon*. Mill Creek Publishing, Ontario.
- King, A. 1971. *Early Boats on Lake Nipigon*. (unpublished)
- Koonz, W.H. 1987. Status report on the American White Pelican *Pelecanus erythrorhynchos* in Canada. COSEWIC. 16pp
- Kuntz, S. 2001. Lake Nipigon Basin Recreation Inventory Report for the Signature Site. Ontario Ministry of Natural Resources, Nipigon District. Unpublished.
- Macins, V. 1991. Status of the white pelican in Ontario. Ontario Ministry of Natural Resources. Kenora, Ontario. 28 pp.
- MacKay, H.H. 1951. The Net Plankton of Lake Nipigon. Ph.D. thesis. University of Toronto.
- Manol, D. Personal communication. Fire Management Supervisor. MNR Nipigon District.
- McKirdy, W. M., "The Virgin Nipigon Country", Brochure for the promotion of Outfitting Service, Orient Bay, Ontario.

- McLeod, J.A. and G.F. Bondar. 1953. A brief study of the Double-crested Cormorant on Lake Winnipegosis. *Canadian Field Naturalist*. 67:1-11.
- Monk, C.E. 1966. Black Sturgeon Lake. Unpublished. OMNR files, Nipigon District. 15 pp.
- Natural Heritage Information Centre List of Ontario Mammals,
<http://mnrweb.mnr.gov.on.ca/nhic/lists/listout.cfm?el=am> [<http://mnrweb.mnr.gov.on.ca/nhic/>](http://mnrweb.mnr.gov.on.ca/nhic/)
 Ontario Ministry of Natural Resources, 2001.
- Near, F.M. 1982. Nipigon River. History of development power and storage. Report No. 82579 File No. 143-50. Ontario Hydro.
- Newmaster, S.G., A. Lehela, P.W.C. Uhlig, S. McMurray, and M.J. Oldham. 1998. Ontario Plant List. Ontario Ministry of Natural Resources, Ontario Forest Research Institute, Sault Ste. Marie, Ontario, Forest Research Information Paper No. 123, 550pp. + appendices.
- Noble, T.W. 1979. Life Science Report, Phase II, Site Region 3W, North Central Region. Thunder Bay, Ontario.
- Northern Bioscience Ecological Consulting. 1997. A Biological Inventory and Evaluation of Windigo Bay Provincial Park. Thunder Bay, Ontario. 73pp.
- North-South Environmental Inc. 2001. Evaluation of the ecological (life sciences) values of the Lake Nipigon Basin provincial parks/conservation reserves/enhanced management areas. 144 pp. plus appendices.
- Nyman, Anders. 2001. Personal communications, seasonal resident of Poplar Point.
- Odorrizzi, P. Personal communications. Charter Boat Operator and resident of Orient Bay.
- Old Fort William, 2000. *Lake Nipigon and the Fur Trade*. Thunder Bay, Ontario. (unpublished)
- Ontario Ministry of Natural Resources, 1979. "History of Lake Nipigon", Lake Nipigon Park Brochure, Parks Branch.
- Ontario Ministry of Natural Resources, 1982. Nipigon Land Use Plan, Background Information, Nipigon District, Nipigon, Ontario.
- Ontario Ministry of Natural Resources, 2000. *Archaeological information Pertaining to the Proposed and Existing Protected Areas Within the Lake Nipigon Basin*. Northwest Region, Thunder Bay, Ontario.
- Ontario Ministry of Natural Resources. 1987. Lake Nipigon Integrated Resource Management Plan, Background Information. Queen's Printer of Ontario.
- Ontario Ministry of Natural Resources. 1988. Lake Nipigon Integrated Resource Management Plan.
- Ontario Ministry of the Environment. 1992. The provincial water quality monitoring network in Northwestern Ontario. Data Summary 1968 to 1990. Water Resources Group Northwestern Region. April 274 pp plus appendices.
- Ontario Ministry of the Environment. 2001. Guide to Eating Ontario Sport Fish. 21 edition. 227 pp.
- Parent, Shaun. North of Superior: Orient Bay Ice Climber's Guide. Granite Publishing, 1993.
- Parker, B.J. 1988. Status of the Deepwater Sculpin, (*Myoxocephalus thompsoni*), in Canada. *Canadian field - Naturalist* 102(1): 126-131.
- Paterson, M.J., D.C.G. Muir, B. Rosenberg, E.J. Fee, C. Anema and W. Franzin. 1998. Does lake size affect concentrations of atmospherically derived polychlorinated biphenyls in water, sediment, zooplankton and fish? *Can. J. Fish. Aquat. Sci.* 55:544-553.
- Paulsen, H. Personal communications. Enforcement Supervisor. MNR Nipigon.
- Peck, G.K. 1987. American White Pelican. P. 508 in *Atlas of the Breeding Birds of Ontario* (M.D. Cadman, P.F.J. Eagles and F.M. Hilleiner, Compilers). University of Waterloo Press, Waterloo.

- Peck, G.K. and R.D. James. 1983. Breeding Birds of Ontario: Nidology and Distribution. Volume 1, Nonpasserines. Life Sciences Miscellaneous Publication. Royal Ontario Museum, Toronto.
- Pinder, R. Personal communications. Project Leader, Nipigon Basin Signature Site.
- Postupalsky, S. 1971. Toxic chemicals and declining bald eagles and cormorants in Ontario. Unpub. Canadian Wildlife Service.
- Ratcliff, Brian. 2001. Personal communications. Wildlife Biologist, Thunder Bay Region, OMNR.
- Ritchie, B.J. and J. Black. 1988. Status of the Lake Nipigon brook trout fishery and assessment of potential stresses, 1923 to 1987. Lake Nipigon Fisheries Assessment Unit, OMNR, Nipigon, Report 1988 - 1 (MNR #4235).
- Rowe, J.S. 1972. Forest Regions of Canada. Department of the Environment Canadian Forestry Service. Ottawa. Publication No. 1300. 172 pp.
- Royal Ontario Museum and Ontario Ministry of Natural Resources. 1999. Ontario's species at risk. World Wide Web <http://rom/on/ca/ontario/risk.html>.
- Savioja, T. 1986. Water Chemistry Monitoring Program on lake nipigon 1983-1984. Lake Nipigon Fisheries Assessment Unit Report 1986-1985. OMNR. 31 pp.
- Schraeder, H.A. 1983. Lake Nipigon Fisheries Management Plan, Background Information.
- Swainson, R. 2000 & 2001. Personal Communication. Biologist, MNR Nipigon.
- Swainson, R. 2001. Angler Tagging Summary Report. Ontario Ministry of Natural Resources. Unpublished.
- Swainson, R. 2001a. Fish and Fisheries of Lake Nipigon, the Nipigon River and the Black Sturgeon River System. Ontario Ministry of Natural Resources. In preparation.
- Swainson, R. 2001b. Water resources, limnology and power generation of the Lake Nipigon Basin, the Nipigon River and the Black Sturgeon River system. Ontario Ministry. In preparation.
- Swainson, R. & McNaughton, K. 2001. Wildlife of the Lake Nipigon Basin. Ontario Ministry of Natural Resources. In Preparation.
- Thompson, I.D. 2000b. Forest vertebrates of Ontario: patterns of distribution. In: A.H. Perera, D.L. Euler, and I.D. Thompson (editors). Ecology of a Managed Terrestrial Landscape: Patterns and Processes of Forests in Ontario. Vancouver, British Columbia: University of British Columbia Press. 54-73.
- Thunder Bay Field Naturalists. 1991-1993. Lake Nipigon Surveys 1991, 1992, 1993.
- Thunder Bay Field Naturalists. 1998. Checklist of vascular plants of Thunder Bay District. Thunder Bay, Ontario. 50 pp.
- Todd, J. October 1977. *The Nipigon Tramway in Canadian Rail*. Canadian Railroad Historical Association, Montreal, Quebec.
- Van Ogtrop, A. 2001. Lake Nipigon Angler Surveys 1993 to 1999. Lake Nipigon Fisheries Assessment Unit. Northwest Science and Technology Technical Report TR-129.
- Van Scheik, W.J. 1985. Thermal aspects of the reproductive ecology of the Double-crested Cormorant (*Phalacrocorax auritus*) in southern Alberta. PhD Thesis, Philosophy Dept. University of Alberta.
- Van-Wagoner, D. 2000. Lake Nipigon Basin report on economic and tourism values. Ontario Ministry of Tourism, Thunder Bay. Unpublished.
- Waters, T.F. 1987. The Superior North Shore. A natural history of Lake Superior's northern lands and waters. University of Minnesota Press. Minnesota
- Whalen, James, 1998. *Royalty on the Nipigon: The one that didn't get away*. The Archivist, No. 117, 1998.
- Whittle, D.M., R.M. Kiriluk, A.A. Carswell, M.J. Keir, D.C. MacEachen. Tozaphene congeners in the Canadian Great Lakes basin: temporal and spatial food web dynamics. Chemosphere; 40 (9-11): 1221-6; 2000 May-June.
- Wilson, A.W.G. 1902. In Summary Report of the 1901 Geological Survey of Canada.